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No. 1.

INTRODUCTORY.

With this number, we commence a new volume, and we hope a prosperous year for our BULLETIN. We trust in the future as we have tried in the past to make it a compendium of useful Entomological knowledge.

For the coming year we promise for the Lepidopterists a completion of the "Synopsis of the Genera of the Noctuidæ," the continuation, in perhaps a somewhat different form of the synopses of Butterflies, and general articles of interest about the life history, so of the larvæ and imagines of Lepidoptera—for the Coleopterists we shall complete our synopsis of the *Carabid* genera, besides this we shall have as usual, descriptions of larvæ with an occasional plate, and articles of general interest on the habits etc. of beetles. If there should be space remaining after this, or if our subscription list should warrant us in enlarging our BULLETIN we shall also give synopses of the species of some of the Noctuid genera and further synopses of Coleoptera. In any case we shall make our BULLETIN the most useful and practical work for the collector and student of Entomology that our space admits of.

Believing that our collectors would rather know the species already described than to read descriptions of new species and varieties, often of doubtful validity and based on imperfect or rubbed single specimens, our BULLETIN will aim in the former direction entirely and new descriptions will be few.

We hope that our subscribers will favor us with prompt remittances for the amount of their subscriptions for Volume V, to be sent to the BROOKLYN ENTOMOLOGICAL SOCIETY P.O. Box 90, Station W. Brooklyn, N. Y., whence also all communications for the editors should be addressed.

The Publication Committee of the

BULLETIN OF THE BROOKLYN ENTOMOLOGICAL SOCIETY.

Description of the larva of *Silpha americana*. *Lin.*

By F. G. SCHAUPP.

Form oval, very broad, broadest at middle.

Color, deep black above, dark gray beneath.

Length 20 mm.

Head small, rounded, broader than long, slightly scabrous anteriorly.

Eyes four on each side.

Antennæ four-jointed, first broad but very short, the three others of equal length, much longer than the first, the third dilated at the outer side near the tip, fourth slender, tapering to a point.

Mandibles short, very strong, obtuse, two blunt teeth at the inner side.

Maxillæ thick, short, first joint small, 2nd joint large, broader at base supporting the lobe, first joint long and thick, slightly contracted near the middle, and with a row of stout bristles at the inner side near tip, and the second joint very short, flattened and hairy at tip, looking like a cap surmounting the first joint; the maxillar palpus three-jointed, the joints being nearly of equal length, the first constructed at the middle, the 2nd slightly clavate at tip, 3rd tapering to a point.

Mentum heart shaped, ligula of nearly same form, labial palpi widely separated, with two joints of equal length, the second more slender.

Prothorax, much broader than head, twice as broad as long, broader at apex.

Meso-and *Metathorax* shorter and wider than prothorax.

Abdominal segments nine, of equal length, becoming narrower towards the tip, each with an impressed puncture at each side, a very short anal fork; posterior angles distinct.

Legs, rather short, stout, *coxæ* thick and glabrous, *femora* elongate, pilose, *tibiæ* short and cylindrical, studded with strong spines, *tarsi* with one claw.

As I remarked (Bull. II, 30.) the raising of *Necrophori* and *Silphidæ* would be a very easy thing, so it was. I have tried it with but two species: *Necrophorus tomentosus* and *Silpha americana*, and I was successful enough.

The larvæ of the different species of *Silpha* resemble each other very closely; they are stout, broad and entirely black. They run and grow very quickly and are hearty eaters; they moult about every fifth day, just after a moult they are snow white, but soon become black.

One larva obtained May 20, was motionless June 20, pupated June 23, developed July 4.

———: vestiture consisting of flattened hair; thorax and abdomen untufted, the latter exceeding secondaries.

Exyra.

———: vestiture hairy; tongue strong; thorax quadrate, with anterior crest and posterior tuft; abdomen untufted: primaries large.

***Gortyna.**¹³

———rounded, swollen: palpi porrect, exceeding head by one-half its length: wings angulated.

***Eutoreuma.**

B. Clypeus without projection.

a. Palpi not exceeding front.

§ VESTITURE HAIRY.

† Tongue weak, membraneous.

Vestiture long, thin, divergent: head retracted: thorax untufted.

Euthisanotia.

——— short and thick: thorax tufted behind collar: abdomen smooth; closely scaled; exceeding secondaries; wings large, apices of primaries acuminate.

Choephora.

†† Tongue strong: corneus.

Body stout; abdomen slender; vestiture long and loose: head much retracted; primaries short, narrow, sub-equal.

Tapinostola.

Entirely robust; hair flattened: thorax with a small anterior and divided posterior tuft: head more free: primaries elongate, broadening outwardly.

Macronoctua.

§§ VESTITURE HAIRY, WITH FLATTENED SCALES INTERMIXED.

Clypeus globose; palpi heavily fringed beneath; primaries short, broad, triangular: body slight.

Annaphila.

Head retracted: body stout, depressed; vestiture flattened: primaries elongate, narrow, only slightly widening outwardly.

Caradrina.¹⁴

Head larger; thorax convex, tufted: abdomen with prominent dorsal tufts: primaries broader.

Raphia.¹⁵

b. Palpi exceeding the head by twice its length or more.

§ OCELLI WANTING.

Palpi divaricate: primaries short, broad, triangular; apex acute. ***Hexeris.**¹⁶

——— oblique; wings large, frail, geometriform. ***Phalenostola.**¹⁶

§§ OCELLI PRESENT.

† Primaries divided nearly to the middle.

Palpi divaricate, sickle shaped.

Tortricodes.

†† Primaries angulated.

Palpi recurved, with a long brush of hair at tip, reaching backward to base of thorax: wings narrow.

Palthis.

———: 3rd joint less than half as long as 2nd; slender, flattened; terminating in an acute spine: 2nd joint with elongate vertical scales beneath, near tip.

Phalænophana.

———; much flattened, terminated by a brush of hair; tongue moderate: body robust, thorax subquadrate; abdomen conic: outer margin of primaries dentate.

***Teratccera.**^{16½}

———: 3rd joint more than half as long as second; obtusely terminated: all smoothly scaled.

Pangrapha.

—— horizontal, flattened, *-Hypena* like; 3rd joint vertical.

***Dercetis.**

††† Primaries not angulated.

* *Palpi horizontal, second joint disproportionately long, flattened, clothed with elongate vertical scales.*

——— terminal joint short, obtuse: primaries elongate, narrow, outer margin sub-sinuate: secondaries very large and broad: vestiture scaly, abdomen with small tufts at base.

Hypena.

Vestiture consisting of flattened hairs: palpi shorter; form more robust; primaries broader, outer margin oblique. hind angle with a slight tooth.

Plathypena.¹⁷

Wings large, proportionate: primaries with costal margin convex: ♂ usually with a long brush of hair on anterior tibia, and sometimes with antennæ thickened near middle.

Herminia.¹⁸

Primaries rather broader, more triangular; costal margin concave: terminal joint of palpi very short ♂ antennæ with a node and a tuft of a hair at middle.

Renia.¹⁹

Form slight, terminal joint of palpi long, needle shaped: primaries narrow, apices sub-rectangular: secondaries broad: ♂ antennæ with long slender pectinations.

Thaumatopsis.

Antennæ (♂?) scaled above, with long setose pectinations outwardly; inside the processes are shorter, interrupted $\frac{1}{3}$ from base by a stout claw-like process; wings ample, abdomen exceeding secondaries.

***Pallachira.**²⁰

♂ antennæ plumose; branches setose; wings wide and short.

***Pseudorgyia.**²¹

** *Palpi porrect, oblique or curved, with more or less divergent hairy or scaly clothing.*

——— *Hypena* like oblique; terminal joint short; wings proportionate, primaries with apex acute, produced; outer margin oblique.

Lomanaltes.

——— terminal joint $\frac{2}{3}$ as long as second, both flattened, and equally broad, truncate at tip; robust; outer margin of primaries less oblique.

Hypenula.

——— divaricate, flattened; terminal joint suddenly acute at tip.

Antiblemma.

——— sickle shaped, flattened, with sparse vertical hair; terminal joint long, acute; anterior tibia of ♂ usually with a long brush of hair, and ♂ antennæ sometimes with a node near the middle: primaries ample, broadening outwardly; outer margin somewhat oblique.

Zanclognatha.²²

Form more frail: wings broader: brush on anterior tibia of ♂ incomplete.

***Pityolita.**²³

Wings shorter and broader: terminal joint of palpi short, truncate at tip: ♂ antennæ with a node $\frac{1}{3}$ from base.

Megachyta.

Primaries long, narrow: costal margin concave, apex produced: head prominent.

Bleptina.

——— large, with the outer margin somewhat produced at middle: anterior tibia of ♂ with a brush of short hair: legs stout, clothed with long silky hair: abdomen exceeding secondaries.

Spargaloma.

Palpi oblique; second joint flattened; terminal nearly as long as second, closely scaled; antennæ ♂ & ♀ pectinate; primaries with a prominent acute tooth at middle of inner margin and another at hind angle.

Plusiodonta.

——— arquate: 2nd joint flattened, 3rd filiform: tongue moderate: legs moderate: ♂ with a brush of hair on anterior, and decided bend inwardly below the knee, on posterior tibiæ:

***Coptoconemia.**

*** *Palpi closely scaled.*

Terminal joint as long as 2nd, slender: wings large: primaries triangular, outer margin rounded.

Pseudoglossa.

——— $\frac{1}{2}$ as long as 2nd: ♂ antennæ strongly bi-pectinate; at basal third with a slight tuft of scales inside: primaries narrow; crambiform.

***Sisyrhypena.**

Palpi divaricate; pointed: antennæ simple: primaries wide, outwardly full: body parts proportionately small.

***Tripudia.**

——— sickle shaped; terminal joint $\frac{1}{2}$ as long as 2nd: head large; clypeus prominent: ♂ antennæ bent at basal third: legs stout; posterior tibia with disproportionately long middle spurs.

***Cleptomita.**²⁴

C. Palpi exceeding the head by its own length.

* Palpi horizontal.

——— flattened, terminal joint short: broadest at middle, thence tapering obliquely to tip; with the pointed frontal tuft forming an apparent snout; wings large, with unusually long fringes; vestiture hairy.

Scolecocampa.

— as before; form slight; size small; vestiture scaly; wings short and broad; primaries without accessory cell. **Rivula.**

— —: head very small, sunken: thorax disproportionately heavy; abdomen slight, filiform, exceeding secondaries: primaries produced at inner margin near base. **Hyblæa.**²⁵

— more equal; terminal joint long and stout: front with a pointed tuft: antennæ lengthily ciliate: secondaries rounded. ***Eubolina.**²⁶

— —; terminal joint $\frac{1}{2}$ as long as 2nd: drooping: primaries broad, widening outwardly: anterior tibia of ♂ with a brush of hair at outer side. **Anticarsia.**

— — terminal joint short, flattened; truncate at tip: ♂ antennæ plumose: wings short and narrow; abdomen exceeding secondaries by $\frac{1}{2}$ its length. **Ingura.**

Form slight; head prominent: primaries elongate, narrow, widening outwardly: apex acute: secondaries large; exceeded by abdomen: vestiture hairy. **Platysenta.**

**** Palpi oblique.**

— stout; 2nd joint clavate at tip; 3rd moderate: legs strong, rather short; tibiæ with long silky hair: primaries triangular, rather short and broad. **Pseudo'imacodes.**

— somewhat flattened; terminal joint short: primaries narrower, with costal and hind margin nearly equal. **Philometra.**²⁷

— —; 2nd joint ensiform: head small with an upright pointed frontal tuft: primaries falcate at tip; secondaries produced at middle. ***Isogona.**

— —: 2nd joint broad at tip; terminal short: primaries narrow, elongate, sub-equal; apex rectangular. **Eucalyptera.**

— —: 2nd joint more equal; terminal longer: primaries short and broad; apex rather acute. **Prothymia.**

— —: — — — — equal; terminal moderate, horizontal: primaries long, lanceolate: ♂ antennæ strongly bipectinate. **Doryodes.**

— —: terminal joint about equal to 2nd: front with a pointed tuft: thorax and abdomen tufted: primaries long, apex rectangular; outer margin straight to middle, thence deeply excavate to hind angle: secondaries unusually small. **Eurrhipia.**²⁸

Palpi as before: head large: primaries short, broad triangular; Secondaries comparatively small. **Gyros.**

— with terminal joint closely scaled, short and acute; front with a pointed tuft; primaries rather narrow, with sub acute apices; Secondaries large rounded. ***Madopa.**²⁹

BADISTER, *Clairv.*

Leconte, Short Studies on N. A. Coleoptera, Trans. Am. Ent. Soc. VIII, 165, classifies the species as follows:

Elytral striae deep, interspaces narrow, convex; antennæ and legs rufo-testaceous, elytra rufo-piceous, clouded behind..... **1 notatus.**

Elytral striae fine, interspaces flat.

Elytra spotted.

Prothorax, legs, and elytra bright yellow, the latter with broad medial band interrupted at the suture, and an apical blotch iridescent black; basal impressions of thorax shallow, but broad..... **2 pulchellus.**

Prothorax, legs and elytra bright yellow, the latter with the black markings confluent longitudinally from the fourth to the eighth stria, basal impressions of thorax shallow and small..... **3 bipustulatus.**

Prothorax black, legs and elytra orange, the latter behind the middle mostly black.

Side margin of prothorax a little wider and more reflexed towards the base; broad elytral medial band and an apical spot confluent longitudinally from the 4th to the 6th stria..... **4 maculatus.**

Side margin of prothorax not wider near base; elytral spots confluent from the 4th to the 9th stria..... **5 elegans.**

Elytra not spotted.

Prothorax and legs testaceous, elytra piceous; suture, side margin, epipleuræ and base testaceous; hind angles of prothorax broadly rounded, side margin fine, scarcely broader near base..... **6 obtusus.**

Piceous, head as wide as prothorax; hind angles of prothorax obtuse, slightly rounded; base obliquely truncate each side, side margin slightly wider and more reflexed near base..... **7 ferrugineus.**

Entirely black, head narrower than prothorax, which is formed as in *ferrugineus*, but less narrowed behind..... **8 anthracinus.**

Black, or nearly so, legs yellow.

Hind angles of prothorax very much rounded..... **9 flavipes.**

Hind angles of prothorax obtuse, feebly rounded; side margin narrow, not more reflexed towards the base, margin piceous..... **10 micans.**

Hind angles of prothorax obtuse, not rounded; side margin wider and more reflexed near base, margin piceous..... **11 reflexus.**

1. *B. notatus*, Hald. Proc. Ac. Phil. I, 299. *terminalis* Lec. Proc. Ac. Phil. II, p. 51. N.Y. Ills. La.—4.5 mm.

2. *pulchellus*, Lec. Ann. Lyc. IV, p. 418. Ga. N.Y. Ind.—5.5–6.5 mm.

3. *bipustulatus*, Fab. Syst. El. I, 203. Europe. Vancouver Island.—6 mm.

4. *maculatus*, Lec. Trans. Am. Phil. X, 387. Pa.—6 mm.

5. *elegans*, Lec. Trans. Am. Ent. Soc. VIII, 165. Tex.—5.5 mm.

6. *obtusus*, Lec. Proc. Am. Phil. Soc. XVII, 594. Lake Superior. 5.8 mm.

7. *ferrugineus*, Dej. Spec. V, 690, *submarinus* (small var.) Motsch. Bull. Mosc. 1859. III, 158. Cal. Ills.—4.5–5 mm.

8. *anthracinus*, Lec. Proc. Ac. Phil. 1859, p. 83. Or. Cal.—6 mm.

9. *flavipes*, Lec. Trans. Am. Phil. X, 388. N.Y. La. Fl.—6 mm.

10. *micans*, Lec. Proc. Ac. Phil. II, 52. Ann. Lyc. IV, 318. Fla. Mass. Ga.—5–6 mm.

11. *reflexus*, Lec. Trans. Am. Ent. Soc. VIII, 166. N. Y. Mich. La.—4 mm.

Badister testaceus, Hald. Proc. Ac. II, p. 52. is *Stenolophus alternans*, (teste Leconte,)

SELENOPHORUS, Dej.

Synoptic table by Geo. H. Horn, M.D., Proc. Ac. Phil. Soc, XVIII,
p. 179.

Prosternum obtuse at tip, not margined.

Species with bronzed surface lustre.

Intervals of elytra smooth, not pubescent, eighth stria not distinct from margin.

Elytra at tip feebly sinuate, the outer interval punctulate.

Elytral punctures large, almost foveolate. **palliatius**, Fab.

Elytral punctures very small. **pedicularius**, Dej.

Elytra at tip strongly sinuate, the outer angle subdentate.

Outer interval not punctulate. **fatuus**, Lec.

Intervals punctulate and pubescent, eighth stria more distinct from the margin than the seventh. **breviusculus**, Horn.

Species black above, more or less iridescent.

Thorax as wide or wider at base than apex.

Outer interval punctulate. **opalinus**, Lec.

Outer interval not punctulate. **gagatinus**, Dej.

Thorax distinctly narrowed at base.

Hind angles obtuse.

Marginal interval punctulate. **iripennis**, Say.

Hind angles rectangular and prominent. **subtinctus**, Lec.

Prosternum horizontal, tip slightly prolonged and margined.

Thorax not broader at base than apex.

Form rather narrow, elytral punctures foveolate. **fossulatus**, Dej.

Form broader, elytral punctures small. **ovalis**, Dej.

Thorax broader at base than apex, sides nearly regularly arcuate from base to apex.
ellipticus, Dej.

S. palliatius, Fab. Ent. Syst. Suppl. p. 58. = *stigmatosus*, Germ. Ins. Spec. nov. p. 25.
= *impressus*, Dej. Spec. IV, p. 82. = *læsus*, Lec. Proc. Acad. 1858, p. 59. Fla.
S. Cal. — 7-8 mm.

pedicularius, Dej. Spec. IV, p. 100. = *troglodytes*, Dej. ibid. p. 101. = *æreus*, Lec. Ann.
Lyc. IV, p. 293. = *planipennis*, Lec. ibid. o. 294. N.Y. Kans. Fla. Ariz. 5-6.5 mm

fatuus, Lec. New Spec. 1863, 17. = *excisus*, Lec. Gulf St. — 5-6 mm.

breviusculus, Horn. Proc. Ac. Phil. Soc. XVIII, 179, Ind. Ter. — 6.5 mm.

subtinctus, Lec. Proc. Acad. 1866, p. 365. La. — 6 mm.

iripennis, Say. Trans. Am. Phil. Soc. II, p. 30. = *varicolor*, Lec. Ann. Lyc. IV, p. 292.
Ills. Ga. Tex. — 6.5 mm.

gagatinus, Dej. Spec. IV, p. 112. = *maurus*, Hald. Proc. Acad. I, p. 306. = *viridescens*,
Lec. Ann. Lyc. IV, p. 292. Mass. Tex. — 7.5 mm.

opalinus, Lec. List. Col. N.A. p. 13, = *iripennis*, † Lec. Ann. Lyc. IV, p. 289. N. Y.
Mich. Fla. S. Cal. — 9-10 mm.

fossulatus, Dej. ibid. p. 88. Ga. Fla. — 6 mm.

ovalis, Dej. Spec. IV, p. 106. Ga. Fla. — 7 mm.

ellipticus, Dej. ibid. p. 108. = *granarius*, Dej. ibid. p. 109. = *pulicarius*, Dej. ibid. p.
108. N.Y. Ga. Tex. — 5-6 mm.

On the species of *Pterostichi*, *Bon.*

By F. G. SCHAUPP.

One of the most mixed up groups of Carabidæ is that of *Pterostichi*. The greatest Coleopterists have worked at it, but while Latreille unites all the species in one genus *Feronia*, to which Bonelli adds the genera of *Poecilus*, *Pterostichus*, *Platysma*, and *Abax*, Megerle those of *Argutor* and *Steropus*, Ziegler that of *Omasseus*,—Chaudoir divided them into 42 genera!!

Leconte divided our species into six genera, namely *Evarthrus*, *Lophoglossus*, *Holciophorus*, *Pterostichus*, *Loxandrus*, and *Piesmus*, (Proc. Ac. Phila. 1873, p. 302.) retaining however ten of the above generic names for subdivision of the genus *Pterostichus*. Horn in his recent treatise on the genera of Carabidæ (Trans. Am. Entom. Soc. IX, p. 139.) recognizes but three genera, viz: *Pterostichus*, *Evarthrus* and *Loxandrus*, reverting *Lophoglossus*, *Holciophorus*, *Piesmus* and the second half of *Evarthrus* to *Pterostichus*.

In Gemminger and Harold's Catalogus our species have been placed into seven genera viz: *Poecilus*, *Argutor*, *Omasseus*, *Steropus*, *Pterostichus*, *Abax* and *Platysma*.

The genus **Poecilus** (first antennal joint compressed) embraces besides species 617-627 in Crotch's Check-list, also *Pt. Californicus*. The genus **Argutor** (first antennal joint rounded; epimera of metathorax longer than broad; last joint of palpi oval,) contains besides our species of *Loxandrus*, *Pt. honestus*, *lachrymosus*, *purpuratus*, *lustrans*, *erythropus*, *patruelis*, *femoralis*, Kirby, and *desdiosus*. The genus **Omasseus** (last joint of palpi cylindrical, truncate) embraces the Nos. in Crotch 628 to 631, also our former *Lophoglossus*, *Pt. mutus* and *Ev. gravidus* Hald.

To the genus **Steropus** (epimera of metathorax not longer than broad, posterior angles of prothorax and humeri rounded) belong all our species of *Evarthrus*, and also *Pt. tumescens*, *obscurus*, and *ventralis*, which in fact seem on a general view very properly placed among the *Evarthri*.

Abax contains four species, namely: *Pt. fallax*, *sculptus*, *striatus*, and *permundus*.

To **Pterostichus** (hind angles of prothorax and humeri more or less prominent) belong *Holciophorus ater*, then *Pt. Menetrisii*, *castanipes*, *Isabellæ*, *longicollis*, Lec., *sphodrinus*, *mancus*, *lucricus*, *coracinus*, *stygius*, *protensus*, *moestus*, *punctatissimus*.

Platysma includes *Piesmus*, *Pt. planctus*, *herculeus*, *validus*, *protractus*, *vicinus*, *angustus*, *amethystinus*, *castaneus*, *longicollis*, Motsch., *adoxus*, *vitreus*, *orinomum*, *Luczotii*, *oregonus* and Nos. 645-657 (Crotch.)

Pt. validus, *protractus* and *adoxus* stand in the Catalogus as *Platysma* while their synonyms *algidus*; *inornatus*; *rejectus*, *sustentus* and *subarcuatus* are enumerated as *Pterostichi*; *purpuratus* and *lustrans* are *Argutor*, and *mutus* is *Omasus*.

The Synopsis of the species adapted by Redtenbacher (*Fauna austriaca* 1872, pp. 43, 44, 45) to the European species reads as follows:

Elytra with one stria between the margin and eighth stria.

Epimera of metathorax distinctly longer than broad.

Last palpal joint cylindrical, truncate at tip.

Hind angles of prothorax rounded. **Lyperus.**

Hind angles of prothorax sharp. **Omasus.**

Last palpal joint oviform, slightly truncate. **Argutor.**

Epimera of metathorax slightly longer than broad; hind angles of prothorax prominent, elytra sinuate near tip, third interval with a row of grooves. **Platysma.**

Hind angles of prothorax, and usually humeri rounded **Steropus.**

Elytra with two striae between margin and eighth stria. **Abax.**

Now all these facts show that the generic characters used to divide this group are for the greater part rather weak and variable and the creating of genera will always be arbitrary so long as there is no established code or agreement about what characters have a generic value. But not only the generic characters are variable, also those used to define the species can not always have been very safe and sure, or else the very same species could not have been redescribed by the same author under another name as has been the case in several instances.

When Mr. Salle, the well known French naturalist was here, he demonstrated to me, that those who collect Coleoptera of the world were better judges about classification than those who restrict themselves to their local fauna. I do not dispute this opinion, but I prefer for myself a classification of our home-made genera and species, by which e. g. *Callida decora*, Fab., stands very close together with *C. punctata*, Lec., far more than a cosmopolitan classification, by which these two species are widely separated and attributed to different genera.

Therefore, as we have already published synoptic tables of *Loxandrus*, *Evarthrus*, *Lophoglossus*, and *Holciophorus* we shall publish in our next numbers the synoptic table of *Pterostichus*, as published by Dr. Leconte in 1873. adding the species described since that time, the bibliography, size and locality, which may be welcome to many of our Coleopterists.

D. Palpi porrect reaching to or slightly exceeding base of antennæ.

I. VESTITURE HAIRY.

§ Thorax tufted.

Posterior tufts very large, truncate behind; abdomen with dorsal tufts.

Ypsia.³⁰

§§ Thorax untufted.

Abdomen with large, loose, hairy tufts; anterior legs of ♂ with dense, long, woolly hair; primaries elongate, outer margin slightly waved, inner sinuate, with a decided projection $\frac{1}{2}$ from base.

Ophideres.

——— with loose tufts at base only; primaries broad, outer margin oblique, waved or dentate; secondaries rounded or slightly produced at middle of outer margin.

Erebus.³¹

——— with small scaly tufts on basal segments; cylindro-conic; exceeding secondaries; wings proportionately small, widening outwardly, apex acute.

Aletia.

——— untufted, depressed, with a truncate tuft of hair at tip; wings ample, $\frac{1}{2}$ as broad as long, outer margin rounded.

Amphipyra.³²

———, cylindric; primaries proportionately broader, apex acute; anterior tibia with a brush of long hair at inner side.

Trama.

———, slender; wings with outer margin scalloped; primaries with apex obtuse, palpi flattened; thorax subquadrate.

***Capnodes.**

——— with small scaly tufts; primaries angulated.

Anomis.

2. VESTITURE SCALY.

§ Tongue short; weak.

Palpi securiform, thorax short, globose, smooth; abdomen heavy; primaries pointed at apex, with a strong tuft of erect scales at base.

***Lepidomis.**

§§ Tongue strong.

Wings with outer margins dentate; primaries elongate, triangular, costal and inner margins equal; outer rounded; legs stout, rather short; all the ♂ tibiæ densely clothed with long hair.

Homopyralis.

———: primaries broader; apex acute; outer margin oblique; inner $\frac{1}{2}$ the length of costal; tibiæ as before.

Selenis.

Outer margin of wings entire; body slender; wings large; eyes not prominent; head not projecting.

Epizeuxis.

———: body robust; abdomen sub-cylindro-conic; primaries comparatively small; head prominent, free; eyes globose.

Syneda.³³

———: palpi divaricate, loosely held, disproportionately heavy; closely scaled; ♂ antennæ with a slight tuft of scales inside, within basal third; legs closely scaled; wings like *Renia*.

***Tetanolita.**

D. Palpi moderate; exceeding front, but not reaching base of antennae.

I. VESTITURE SCALY.

Primaries lanceolate: secondaries unusually narrow: robust; abdomen exceeding secondaries by $\frac{1}{3}$ its length.

Phyprosopus.³⁴

—— elongate, narrow, crambiform: secondaries disproportionately large.

Crambodes.

Pyrallidiform: primaries narrow; apex acute, outer margin slightly, excavate beneath; ♂ with a large pellucid impression in discal cell: secondaries rounded, exceeded by the slender abdomen.

Pteraetholix.

§ Thorax and abdomen untufted.

Form robust; size small: primaries rather short, narrow; widened outwardly; secondaries rounded: markings consisting of black marks and dashes on a yellow or reddish ground.

Agrophila.³⁶

—— slighter: primaries short, broad, with very convex costal margin: fringes short.

Nolophana.

—— slight: wings proportionately larger; primaries as before, but fringes twice as long.

Xanthoptera.

—— robust: primaries elongate, widening outwardly: ornamentation, metallic black or brown, on a white ground.

Tarache.³⁷

—— moderate: primaries with depressed costal, obliquely rounded outer, and rather short inner margin: accessory cell wanting.

Thalpochares.

—— —: head closely applied to thorax, which is rather short and convex: abdomen cylindric, subequal; wings rather long; proportionate; outer margin of primaries somewhat excavated near hind angle.

Microcoelia.

—— slight; thorax convex; abdomen depressed: primaries elongate, equal; with confused lines and spots.

***Monodes.**

—— stout: palpi divergent: third joint short, buried in the vestiture of second; tongue moderate: thorax short: primaries with acute apex and a tooth at hind angle: secondaries small.

***Hemiceras.**³⁸

—— —: thorax quadrate, convex: collar and shoulder tippets elevated: abdomen filiform; primaries lanceolate.

Stictoptera.

—— moderate: body slender; abdomen filiform conic; terminating in an acute point: wings with large fringes; primaries produced at apex; secondaries small.

***Panula.**

§§ Abdomen tufted.

Thorax with upright scaly vestiture: abdomen with prominent tufts; primaries long, strongly widening outwardly, apex acute; outer margin oblique: secondaries small, exceeded by abdomen.

Marasmalus.

——— posterior tuft: abdomen with two, more prominent upright tufts at middle: primaries narrow, subequal. **Chamyris.**

——— usually with a slight posterior tuft: abdomen with scaly tufts on dorsum; primaries elongate, narrow, outer margin rounded.

Bryophila.³⁹

Primaries triangular, widening outwardly; otherwise as before; legs closely scaled.

Erastria.⁴⁰

——— rather narrower: thorax apparently without tuftings; legs with fine silky hair.

Lithacodia.⁴¹

2. VESTITURE HAIRY, WITH FLATTENED SCALES INTERMIXED.

§ Thorax and abdomen untufted.

Wings large, primaries with the apex acute; outer margin slightly excavate beneath; hind angle very broadly rounded. **Agnomonia.**⁴²

§§ Thorax with basal tuft.

Palpi divergent: primaries widening outwardly; outer margin oblique; ♂ with a large tuft of raised scales near the base. **Galgula.**

Basal tuft more distinct; scaly: palpi short: ♂ antennæ brush like; body narrow, linear: wings elongate, costal margin depressed. ***Acopa.**

With a low, divided posterior tuft; abdomen with loose hair at base; primaries narrow, elongate, somewhat retreating at hind angle.

Acronycta.⁴³

§§§ Thorax and abdomen tufted.

Anterior thoracic tuft sub-obsolete, front and palpi closely scaled; wings large, proportionate; **Polyphaenis.**

——— ——— absent: two heavy oblique tufts posteriorly; abdomen short; with basal tuft unusually large and heavy; upright: wings rather short, rounded. **Euplexia.**⁴⁴

Vestiture with hair flattened; collar slightly elevated: a distinct posterior thoracic; and moderate dorsal abdominal tufts: primaries elongate, narrow; outer margin rounded: secondaries semi-transparent; exceeded by abdomen. **Prodenia.**

3. VESTITURE CONSISTING OF FLATTENED SCALE-LIKE HAIR.

§ Thorax and abdomen untufted.

† Tongue long and corneous.

Legs closely scaled; with fine long silken hair: wings large, broad; primaries with apex rectangular; rounded at middle of outer margin.

Toxocampa.

†† Tongue moderate, or weak and short.

Vestiture close: head rather large, eyes prominent: thorax ovate: abdomen conic: wings short and broad; primaries triangular: ornamentation continuous on both wings: form robust. **Matigramma.**

More slightly built; head with a pointed frontal tuft; thorax short, convex; vestiture rather loose; wings long and broad; secondaries without ornamentation.

Phoberia.

Head without frontal tuft; wings narrower; primaries somewhat produced at middle of outer margin; abdomen exceeding secondaries.

Homophoberia.

§§ Thorax and abdomen tufted.

♂ antennæ thickened below the middle, with a bend beyond: tarsi with long fluffy hair: second abdominal segment more prominently tufted: primaries broad with oblique outer margin and somewhat produced hind angles.

Eriopus.⁴⁵

Form slight; vestiture somewhat divergent: tuftings small; front closely scaled: wings elongate, moderate, primaries pale-green with large, black, blotchy markings.

Moma.⁴⁶

———: vestiture fine and glossy; thorax with posterior tuft somewhat saddle-shaped, *Plusia* like; abdominal tufts very small; scaly: wings broad and rather short; primaries triangular; ornamentation with a slight metallic lustre.

Telesilla.

——— stouter: vestiture coarse; abdomen with tufts on fourth and fifth segment more prominent; wings moderate; primaries suddenly widening near base, and thus forming a shoulder on costa.

Jaspidia.⁴⁷

——— robust: thorax rounded, heavy; abdomen long and stout, exceeding secondaries by $\frac{1}{2}$ its length: tuftings small; wings short and narrow; outer margin of primaries rounded.

Perigea.

Thorax with a low divided anterior and posterior tuft; abdomen tufted at sides and on dorsum; front with coarse hairy vestiture; wings long; primaries with the outer margin near hind angle somewhat excavated or retracted.

Hadena.⁴⁸

Head more retracted; front with short wooly vestiture: thorax with a prominent divided tuft extending its whole length, and overhanging base of abdomen.

Dipterygia.⁴⁹

4. VESTITURE SIMPLY HAIRY.

§ Primaries with the outer margin strongly dentate.

Vestiture long and coarse; thorax and abdomen tufted: wings large; outer margin of primaries oblique.

Trigonophora.⁵⁰

Primaries narrow; apex roundedly drawn out; outer margin very oblique and somewhat excavated to the hind angle

Brotolomia.

§§ Outer margin of primaries entire.

† Thorax and abdomen untufted.

All the tibiae of ♂ with long silky hair; anterior with a long brush similar to *Herminea*.

Panapoda.⁵¹

PTEROSTICHUS.**DIVISION I.** *Dorsal punctures wanting; marginal stria single.*

Posterior tarsi stout, not grooved on the outer side; epistoma and labrum emarginate; prosternum feebly margined behind..... HAMMATOMERUS, Chaud.

Joints of hind and middle tarsi ♂ ♀ inflated at tip..... 1. *morionides*, Chaud.

Joints of hind and middle tarsi ♂ ♀ normal..... 2. *tarsalis*, Lec.

Posterior tarsi slender, first joint with two grooves and an intervening ridge on the outer side; prosternum (except in *P. planctus*.) strongly margined behind; base of prothorax margined towards the sides.

Sides of prothorax crenato-dentate.

Prothorax feebly narrowed behind, basal foveæ large, bistriate, elytra opaque, deeply striate..... 3. *crenicollis*, Lec.

Sides of prothorax entire, not serrate:

Prosternum scarcely margined behind:

Outer basal stria of prothorax distinct, humeri not dentiform.

4. *planctus*, Lec.

Prosternum distinctly margined behind:

Prothorax feebly narrowed behind, and slightly sinuate on the sides, hind angles rectangular:

Humeral angles dentiform.

Hind angles of prothorax distinctly carinate, outer basal stria long.

5. *herculaneus*, Mann.

Humeral angles not dentiform; sides of elytra more rounded near the base.

Base of prothorax not depressed near the angles, outer stria a feebly impressed fovea..... 6. *validus*, Dej.

Base of prothorax flattened, more narrowed, outer stria short feeble, general form more elongate..... 7. *protractus*, Lec.

Base of prothorax less flattened; outer stria vague or wanting, side of prothorax oblique, scarcely sinuate behind; sides of elytra more parallel than in *validus*.

Scutellar stria distinct (as in the other species of the group):

8. *vicinus*, Mann.

Scutellar stria very short; form narrower..... 9. *longulus*, Lec.

Prothorax scarcely narrowed behind, outer basal impression very short, humeri not dentiform, body small, narrow, sides of elytra parallel.

10. *angustus*, Dej.

Prothorax a little more narrowed behind, flattened at the base, sides scarcely subsinuate, hind angles rectangular, feebly explanate, inner basal stria long, outer one nearly obsolete; humeri dentiform.

Scutellar stria short:

Elytra with a purple reflection..... 11. *amethystinus*, Dej.

Elytra piceous or brownish black..... 12. *castaneus*, Dej.

Scutellar stria long, color black..... 13. *scutellaris*, Lec.

Posterior tarsi slender; prosternum margined at tip: prothorax with inner basal stria distinct, outer one wanting.

Base of prothorax margined towards the sides; humeral angles not dentiform, elytra parallel, sides but little rounded near the base; posterior tarsi with obsolete groove on outside:

Elytral striæ rather fine, interspaces flat, prothorax rather convex, slightly wider than long, rounded on the sides, and not sinuate, base not narrower than tip.

14. californicus, Dej.

Base of prothorax not at all margined:

Posterior tarsi not grooved on the outer side; body less elongate:

Large, prothorax rather flat at base, and feebly narrowed behind, but scarcely sinuate on the sides, elytra not wider than prothorax, striæ fine, interspaces flat, not shining. **15. Menetriesii**, Motsch.

First joint of posterior tarsi with two grooves, and an intervening ridge: body elongate, slender, the prothorax being narrower than the elytra, and more narrowed behind:

Scutellar stria long, (♂ with one, ♀ with two anal punctures each side, as usual)

Prothorax less narrowed behind, elytra more parallel; **16. castanipes**, Men.

Prothorax more narrowed behind, elytra elongate oval:

Hind angles rectangular:

Tarsal grooves extending on the second joint. **17. Spraguei**, Lec.

Tarsal grooves only on first joint. **18. gracilior**, Lec.

Hind angles obtuse rounded at tip. **19. Hornii**, Lec.

Scutellar stria short, elytra elongate oval, deeply striate; (♂ ♀ with two anal punctures each side.)

Prothorax as wide as long, less narrowed behind, and sides less sinuate.

20. Isabellæ, Lec.

Prothorax longer than wide, more narrowed and sinuate behind.

21. congestus, Men.

Posterior tarsi slender, with the usual double groove and intervening ridge on the first joint, prosternum not margined at tip; head of usual size, prothorax narrowed behind, basal impressions linear, single.

Hind angles of prothorax rectangular; base not margined.

Tarsal grooves extending on the second joint, elytral striæ deep, humeri dentiform.

22. adoxus, Say.

Hind angles of prothorax very small rectangular, base margined.

23. longicollis, Lec.

Hind angles of prothorax obtuse rounded. **24. sphodrinus**, Lec.

Posterior tarsi slender, without marginal grooves, prosternum not margined at tip; head very large, hind trochanters very long; prothorax quadrate, moderately narrowed behind, angles rectangular, base broadly foveate each side, not margined, outer stria distinct, with a slight carina.

Hind angles of prothorax more prominent, hind trochanters acute at tip.

25. grandiceps, Chaud.

Hind angles of prothorax less prominent, hind trochanters rounded at tip.

26. rostratus, Newm.

SESIA SYRINGAE, *Harr.*

By GEO. D. HULST.

The female lays her eggs in patches on roughened or knotty places on the bark of the food plants, which are the common Lilac and the English Ash. The eggs hatch in about 6 days, and the newly born larva at once eats its way through the bark into the solid wood. It runs its channels in all directions through the wood, the first one almost always following the pith. The eggs are laid upon, and the larva infest branches generally from 1 to 3 inches in diameter, though I have found them in the main trunk of an Ash 7 inches in diameter. The larva develops through the summer and fall, and at the beginning of the winter is nearly or quite full grown. The larva is very variable in length. The head is corneous, of a bright mahogany color becoming very dark at mandibles, and is sprinkled with scattered hairs. The mandibles are stout, broad, with five teeth. Body light, yellow anteriorly, with first segment semi-corneous above, and more reddish; posteriorly, pale white. Segments, distinctly marked, somewhat flattened; prolegs strong, yellowish, black at points. Abdominal legs distinct.

The larva pupates in a slight cocoon after cutting its way to the bark, of which it leaves only the thin outer skin. The pupation takes place in May. The imago emerges in about three weeks. In the very early spring of 1881 all were out by June 5th. This year, which is very backward, they are yet emerging, (June 27th).

There is very considerable variation in the imagines, both in size and color. In size they vary from five-sixths to one and one-third inches, the females being on the average the larger. In color there is a variation from deep orange to bright yellow on body, wings and legs. Some also have heavy lateral marks on the body, making it almost banded.

The moths emerge early in the morning. The females very strongly attract the males. They mate soon after exit, and those that I have seen remained in coitu all day.

In this section, they are very destructive to both Lilac and English Ash. Large shrubs of Lilacs are now very rarely seen and the English Ash is being rapidly exterminated. In the latter I have seen the wood completely riddled with the holes made by the larvæ, and the tree entirely dead.

My thanks are gratefully given to Mr. John B. Smith of our Society, for his drawings, which accompanying this, illustrate the history and anatomy of this insect.

Explanation to plate I of Vol. V.

1. Larva of *Necrophorus tomentosus*, Web., described page 37 Vol. IV, of *Bulletin*. a. head above; b. head beneath, c. antennæ; d. maxilla; e. mentum.
2. Larva of *Patrobus longicornis*, Say., described at page 56 of Vol. IV, of *Bulletin*. a. head; b. antennæ; c. maxilla; d. mentum.
3. Larva of *Silpha americana*, Lin., described at page 2 of Vol. V, of *Bull.* a. antenna; b. maxilla; c. mentum; d. leg.
4. a & b. Pupa of *Cicindela repanda*. Dej.
5. Pupa of *Chlaenius laticollis*, Say.
6. Pupa of *Galerita janus*; 6a. lateral appendage.
7. a & b. Pupa of *Dorcus parallelus* ♂ described on page 35 Vol. IV, of *Bulletin*. 6b. anus of ♀ of *Dorcus*.
8. *Sesia Syringæ*, Harr., described at page 17 Vol. V, *Bulletin*. a. larva; b. pupa; c. part of antenna of ♀; d. part of antenna of ♂; e. mouth-parts of larvae.

Remarks on some Coleopterous pupæ.

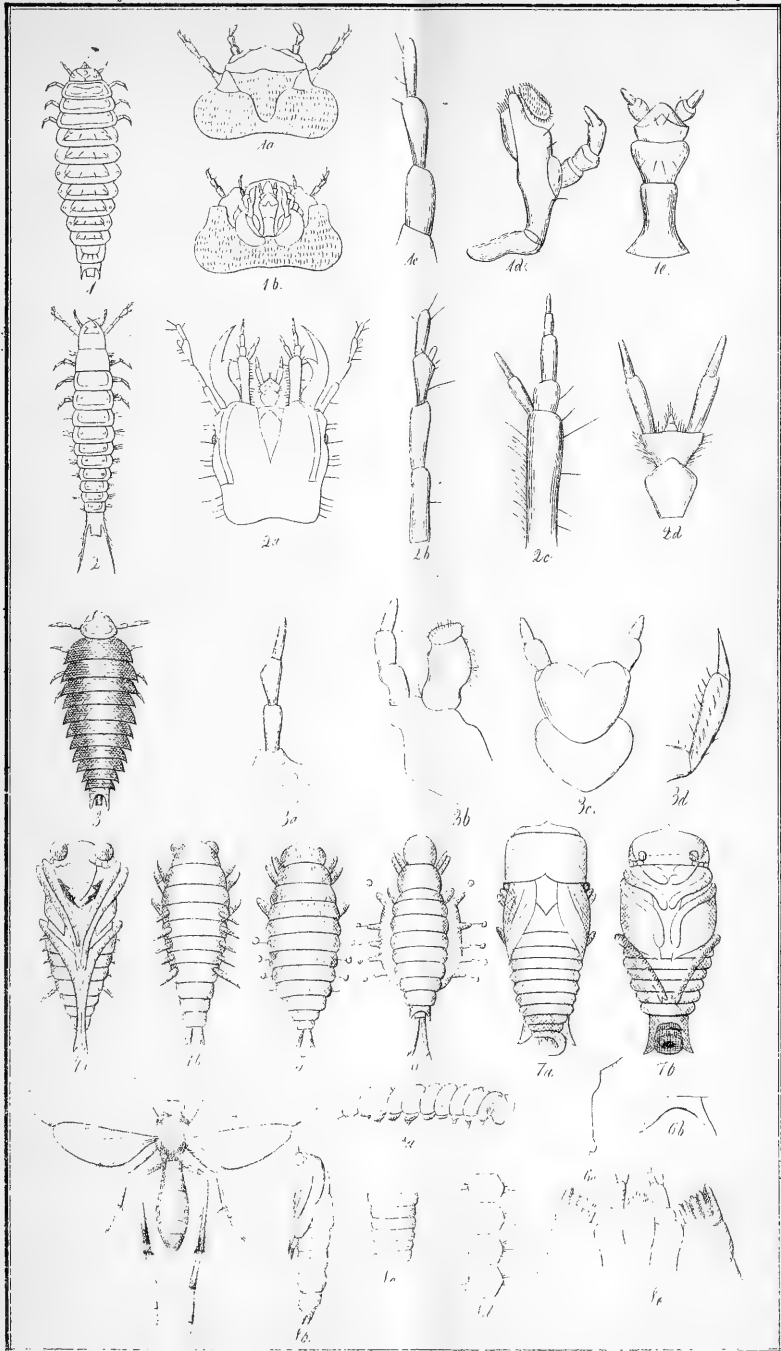
Cicindela repanda. Mandibles very large becoming black a few days before the development of the imago. Sides of abdomen with five stout processes, those on the fifth segment very long. [In some of the specimens I had, these processes were clothed at tip with a brush of hair, others were not, but of all developed *repanda*.]

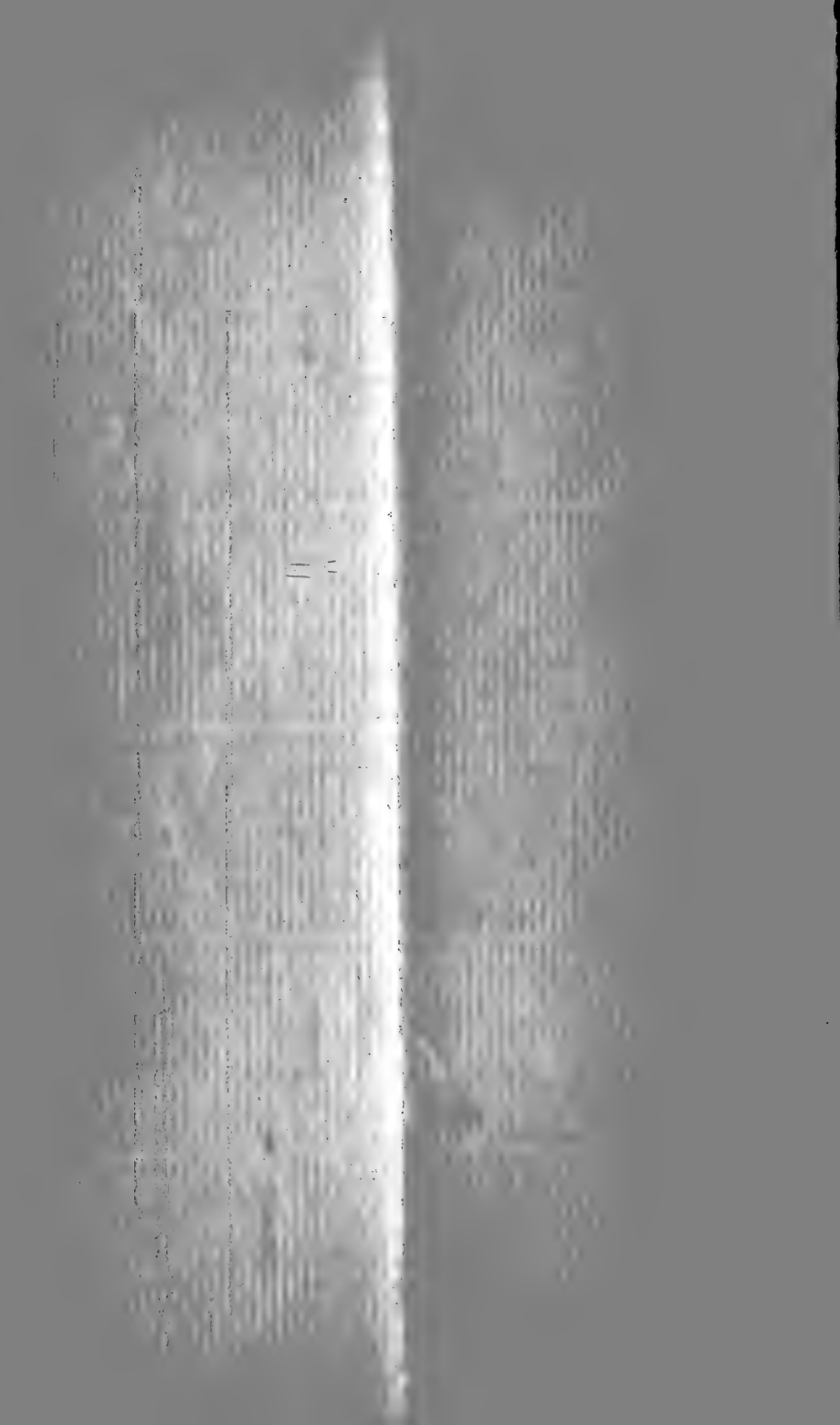
Chlaenius laticollis. All segments except the last two are hairy; abdominal segments 3 to 5 have a lateral process terminated by a knob, while the pupa of *Chlaenius leucoscelis* have no such process.

Dicaelus dilatatus. Resembles the pupa of *Chlaenius*, but is more glabrous above, and the abdominal segments have instead of the lateral projections only bristles.

Galerita janus. Head and prothorax much narrower than any of the preceding pupæ; it is like the larva of the species, of a very peculiar form and it differs from the pupa of *G. Lecontei* figured in Packard's Guide p. 433 by having the lateral appendages not pointed, but with a little knob at the tip.

F. G. SCHAUPP.





Primaries elongate, narrow, crambiform: form slight; thorax short: abdomen depressed, exceeding secondaries. **Senta.**

Form slight: thorax proportionately stout, convex: primaries moderate, with acute apices: secondaries narrow, exceeded by the cylindrical abdomen. **Amolita.**

——— robust, compact: abdomen short, heavy: vestiture divergent; rather thin and silky: wings small; primaries widening outwardly, with sub-acute apices, depressed costal and oblique outer margin.

Melicleptria.⁵²

——— ———: abdomen elongate, conic; closely scaled: wings broad; primaries triangular; costal margin sinuate, apex subacute: legs closely scaled.

Poaphila.

——— ———: ——— short, heavy: wings long and broad; primaries with acute apices and oblique outer margin: legs with long woolly hair.

Zotheca.

†† Thorax tufted, abdomen untufted.

Collar acutely produced at middle; an elevated acute, longitudinal crest behind: abdomen somewhat depressed: primaries narrow, subequal; outer margin excavate beneath apex; rounded at middle.

Plastenis.⁵³

Thorax with an elevated crest behind collar, reaching to base; primaries long, apex rectangular; hind wings rounded.

Chariclea.⁵⁴

——— ——— posterior tuft: primaries moderate, broadening outwardly; apex acute, outer margin slightly excavate beneath; rounded at middle: anterior angles of secondaries slightly produced.

Hydroecia.⁵⁵

——— ———: primaries very narrow at base, widening very strongly outwardly; outer margin oblique, rounded; hind angle somewhat produced, inner margin sinuate.

Calymnia.

——— ——— low and divided: abdomen with loose hair at base: primaries narrow, elongate, somewhat retracted at hind angle.

Acronycta.⁵⁶

——— ——— not divided: head broad, close to thorax; third palpal joint long and slender; tongue moderate: vestiture shaggy coarse.

***Lathosea.**

††† Thorax and abdomen tufted.

Head closely retracted; collar slightly elevated, thorax depressed, with a posterior tuft: primaries elongate, narrow, slightly retracted at hind angles.

Hyppa.⁵⁷

Head more free: thorax with anterior and posterior divided tufts: primaries as before.

Hadena.⁵⁸

Thorax as before: primaries narrow, outer margin rounded at middle; apex rectangular; abdomen exceeding secondaries.

Helotroppha.

DIVISION B. EYES LASHED.

I. TIBIA SPINULATED.

I. ANTERIOR ARMED AT TIP.

A. Clypeus with protuberance.

Protuberance flattened; armature of anterior tibia consisting of a long lateral spine: vestiture hairy; collar projecting; thorax with a mesial crest of elevated hair.

*Pleonectopoda.

—— convex: anterior tibia short, flattened and broader at tip, with strong claws: primaries lanceolate, vestiture long and rather fine.

Nycterophaeta.

B. Clypeus not protuberant,

§ Palpi very short; not reaching front.

Tongue weak, thorax very short, quadrate; with long, coarse and very thick vestiture: wings rather small: abdomen exceeding secondaries.

Dicopis.

§§ Palpi exceeding front.

† Vestiture consisting of flattened hair.

Robust, head large: wings moderate; primaries somewhat retreating at hind angle.

Adita.

Vestiture with coarse scales intermixed; loose: wings disproportionately short and narrow.

Lepipolys.

†† Vestiture hairy.

Collar slightly excavate at sides, raised and acutely projecting at middle: thorax depressed behind: wings narrow, sub-equal.

Metahadena.⁵⁹

Vestiture woolly; somewhat divergent posteriorly; tongue short, weak: armature of anterior tibia consisting of several longer spines at tip.

Pseudorthosia.⁶⁰

2. ANTERIOR TIBIA UNARMED AT TIP.

A. Palpi very short, not reaching front.

Head small, tongue weak: vestiture long, thin, somewhat divergent hair: abdomen depressed: wings moderate.

Ufeus.

B. Palpi exceeding front.

§ Tongue weak.

Thorax with posterior tufts; base of abdomen strongly tufted: ♂ antennæ brush-like.

*Fishia.

§§ Tongue strong, corneus.

Thorax quadrate, somewhat depressed; with basal tuft, and loose tufts on first segment of abdomen.

Anytus.⁶¹

—— rounded; untufted: vestiture long and rather thin: abdomen untufted.

Pseudoglaea.

—: with an acute anterior tuft; abdomen conic with divergent vestiture.

Primaries moderate; subequal: *habitus* of *Orthosia*.

**Ammaconia*.⁶²

**Metalepsis*.

II. TIBIA NOT SPINULATED.

I. ANTERIOR ARMED AT TIP.⁶³

§ *Tongue weak and short.*

Palpi not reaching front: head almost buried in thoracic vestiture, which is long, thin and divergent; primaries widening outwardly with sinuate inner, and oblique outer margin.

Copipanolis.

Vestiture more smooth: primaries short; narrow: secondaries small; exceeded by abdomen.

Eutolype.

§§ *Tongue moderate or strong.*

Vestiture hairy; coarse, short and divergent: beneath, very heavily clothed with long wooly hair; primaries narrow, elongate; with acute apex and very oblique outer margin.

Valeria.⁶⁴

Tibia clothed with long dense hair; anterior with a thickened process terminating in a blunt spine; vestiture consisting of flattened hair.

Euros.

Palpi exceeding front: vestiture with flattened scales intermixed: ♂ ovipositor extruded; wings moderate.

Oncocnemis.

2. ANTERIOR TIBIA UNARMED.

A. Palpi exceeding head by more than its own length.

Hypena like: anterior tibia of ♂ sometimes with a brush of hair: primaries large, apex acute; outer margin excavated near tip, rounded at middle.

Bomolocha.⁶⁵

Form more robust; palpi shorter, oblique; vestiture coarse and shaggy; wings broader: primaries with costal margin excavate. Palpi horizontal; broad; convex without, concave at inner side; terminal joint obsolete: primaries with acute apex, sinuate outer margin, a tooth at hind angle, and a rounded lappet like projection at middle of inner margin.

Calpe.

B. Palpi porrect; reaching to or exceeding base of antennae.

§ Primaries angulated.

Palpi with terminal joint long and flattened; vestiture hairy: wings large; primaries deeply excavate to vein four, and strongly notched or toothed to hind angle.

Scoliopteryx.

§§ Primaries not angulated:

Form stout; vestiture wooly: head very small: thorax convex: abdomen conic; wings broad; primaries with depressed and sinuate costal, oblique outer and rather short inner margin.

Litocala.

Palpi with terminal joint nearly equal to second; flattened, sub-clavate: vestiture long and coarse; without tuftings: primaries narrow, with very oblique outer margin and obtusely rounded hind angles.

Litoprosopus.

Thorax with a large saddle shaped posterior tuft; abdomen with dorsal tufts: wings moderate; primaries often with a tooth at hind angle: ornamentation often metallic.

Plusia.⁶⁶

C. Palpi not reaching to, or but slightly exceeding front.

§ Tongue weak.

Thorax quadrate; very heavy: vestiture coarse, somewhat divergent; primaries widening outwardly; hind margin half as long as costal; apex acute.

Feralia.⁶⁷

— rounded; rather slighter: vestiture long and fine: abdomen considerably exceeding secondaries: primaries elongate, narrow; apex acute.

Arsilonche.⁶⁸

Tongue strong and corneus.

Clypeus with a corneus projection: thorax quadrate: primaries narrow, subequal; outer margin oblique.

Aporophyla.

Like *Feralia* in all points except *tongue*

Arthrochlora.

Collar rounded; projecting hood-like upward: primaries sub-obsolete.

Cucullia.⁶⁹

Thorax depressed, quadrate; collar acutely projecting at middle and sides; excavate between: vestiture coarse: primaries narrow, subequal.

Dryobota.⁷⁰

— with divided anterior and posterior tuft; abdomen obsoletely tufted: primaries with outer margin oblique: ♀ ovipositor extruded.

Cleoceris.

♀ ovipositor not extruded: vestiture hairy, coarse: thorax with an anterior divided tuft; abdomen with small tuftings: primaries narrow, but slightly widening outwardly: outer margin oblique.

Polia.

† Primaries elongate, narrow, equal.

Vestiture elongate, heavy, somewhat divergent: outer margin of primaries rounded: ornamentation sub-obsolete; color yellowish white.

Ommatostola.

Thorax with a raised anterior divided tuft: front with a double tuft.

Xylina.⁷¹

— flattened: produced at middle and sides: excavate between: front with close fine wooly vestiture.

Calocampa.⁷²

†† Primaries wider but equal.

Outer margin nearly straight, body depressed: vestiture close and smooth; thorax with a slightly elevated anterior crest: abdomen more or less flattened.

Orrhodia.⁷³

DIVISION 2. *One dorsal puncture on the third stria, behind the middle; scutellar stria very short; prosternum not margined behind.*

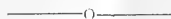
A. Prothorax narrowed behind, hind angles sub-obtuse, basal striae two, the outer one shorter.

Outer basal stria distinct, with a feeble carina; last ventral segment ♂ with a small tubercle near the tip. 27. *mancus*, Lec.

Outer basal stria punctiform, without carina; last ventral segment ♂ with a broad apical impression 28. *diligendus*, Chaud.

B. Prothorax narrowed behind and sinuate on the sides, basal angles rectangular prominent, impressions linear deep, punctulate, elytra more broadly oval,

29. *honestus*, Say.



DIVISION 3. *Elytra with several dorsal punctures; palpi with the last joint cylindrical, truncate.*

Episterna of metathorax short:

Prosternum not margined behind;

Outer stria of elytra finer; dorsal punctures three.

Scutellar stria long. A.

Scutellar stria short. B.

Elytral striae equally deep.

Prothorax narrowed behind, basal foveae large: C.

Prothorax wider behind, basal foveae double, narrow; dorsal punctures 3; D.

ABACIDUS Lec.

Prosternum margined behind; prothorax wider behind, basal foveae double, dorsal punctures three; *PERISTETHUS*, Lec. E.

Episterna of metathorax long:

Prosternum margined behind:

Scutellar stria long, elytra sinuate at tip; *POECILUS*, Bon, F

Prosternum not margined behind; (scutellar stria long, and elytral strongly sinuate at tip).

Prothorax with basal foveae bistriate, and hind angles carinate; dorsal punctures three; *OMASEUS*, Ziegler. G.

Prothorax with linear basal foveae, hind angles not carinate:

Dorsal punctures three; (hind tibiae of ♂ usually hairy on inner side): *DYSIDIUS*, Chaud. H.

Dorsal foveae 5-6; *PLATYSMA*. I.

A.

(Prothorax finely margined; two joints of hind and middle tarsi grooved on outer side last ventral segment ♂ with a short high carina acute at tip.)

Prothorax with linear basal impressions, narrowed behind, hind angles rectangular, elytral striae very fine, scutellar long, but not well defined. 30. *lubricus*, Lec.

B.

- (Prothorax finely margined; tarsi not grooved on the outer side; prothorax much rounded on the sides, with short narrow basal impressions; sides of abdomen punctured).
 Hind angles of prothorax obtuse not rounded, striæ of elytra punctured, form stouter.
 31. tumescens, Lec.
 Hind angles of prothorax obtuse and rounded, form less stout:
 Elytral striæ not punctured. **32. obscurus**, Say.
 Elytral striæ punctured. **33. ventralis**, Say.

C.

- (Prothorax strongly margined; two or three joints of posterior tarsi grooved on the outer side):
 Dorsal punctures two:
 Basal foveæ of prothorax linear, deep. **34. lachrymosus**, Newm.
 Basal foveæ large:
 Hind angles carinate; more or less rounded.
 Foveæ without tubercle. **35. coracinus**, Newm.
 Foveæ with tubercle. **36. stygicus**, Say.
 Hind angles not carinate, foveæ without tubercle. **37. relictus**, Newm.
 Dorsal punctures four, hind angles of prothorax broadly rounded, basal foveæ large and deep.
 Hind angles carinate, color purple, shining. **38. superciliosus**, Say.
 Hind angles not carinate, color dull, nearly black. **39. moestus**, Say.
 Alternate interspaces interrupted by irregular lines and punctures.
 Legs black, thoracic hind angles obtuse. **40. punctatissimus**, Rand.
 Smaller, femora red, thoracic hind angles very broadly rounded. **41. agonus**, Horn.

D.

- (Tarsi without grooves; body oval.)
 Hind angles rectangular, scutellar stria long.
 Basal foveæ and side margin of prothorax not punctured; body wider,
 42. fallax, Dej.
 Basal foveæ and side margin punctured; body less wide. **43. sculptus**, Lec.
 Hind angles rounded, scutellar stria wanting:
 Side margin much wider, impunctured. **44. obsulus**, Lec.

E.

- (Two joints of posterior tarsi finely grooved on outer side, body oval):
 Iridescent, thorax narrowed in front, depressed. **45. permundus**, Say.
 Totally black, thorax quadrate, convex. **46. Hamiltoni**, Horn.

F.

- (Antennæ with joints 1-3 strongly carinate; two or three joints of posterior tarsi grooved on the outer side; basal foveæ of prothorax double.)
 Sides of prothorax not depressed:
 Prothorax distinctly narrowed behind, sides feebly sinuate.
 Body impunctured beneath; outer basal foveæ punctiform, feeble.
 Larger, elytral striæ punctured, dorsal punctures three. **47. subcordatus**, Lec.
 Smaller, elytral striæ not punctured, dorsal punctures two. **48. scitulus**, Lec.

Coleopterological Notes.

By JOHN B. SMITH.

While sugaring for moths I have often captured some very good beetles—not only on sugar, but on flowers. The tall Blackberry is a good thing to examine after dark—on it I have found *Lachnosterna fusca*, *fraterna*, *micans*, *ilicis*, *futilis*, *hirsuta*, *hirticula*, *crenulata* and *hirticollis*: the only specimen of *L. Knochii* in my collection was found on the flowers of blackberry, and large numbers of Lepidoptera are also found on them. The bushes about 8:30 to 9 P.M. in the locality in which I collect are swarming with beetles, and terrible havoc they make with leaves and blossoms. *Diplotaxis tristis*, *Chalepus trachypygus* and some other *Lamellicornis* are also found. *Serica sericea* and *vespertina* fly in numbers around and feed on sumach. On that plant also I have found *Disonycha sexmaculata*—not a common insect by any means—. The wild rose when in bloom must not be passed by. *Trichius*, *piger* and *affinis* frequent it as do *Typocerus velutinus*, *zebratus* and *Strangalia luteicornis*—the latter not very common—*Chalcoparia globosa* and *Paria* two or three species are found on it, while *Rhynchites bicolor* is common nowhere else. Swamp-willow in the vicinity of Brooklyn furnishes *Cotalpa lanigera* while the grape yields *Peidinota*. *Chrysomelidæ* in large numbers are taken with the sweep net in fields in which ox-eye daisies are thick, while small *Buprestidæ* and *Elateridæ* are more common in bushes near the edge of woods. It always pays to examine fungus on trees. *Cratoparis lunatus*, I have found by the hundreds many others less common. Smaller species of *Silphidæ*, *Histeridæ*, *Staphylinidæ*, *Nitidulidæ* and *Erotylidæ* are found on decaying fungus—toadstools and mushrooms. A good way to fix traps for these species is to take a wide mouthed bottle, fill it about half full of fungus and bury it up to its neck in the ground—you will be surprised at the good things you get. Early flowering shrubs deserve close attention. I have taken this season all the species of *Orsodachna* and some very good varieties on those shrubs on which flowers precede the leaves.

The golden rod when in bloom usually repays close examination; *Clytus* frequents it in numbers, *Chauliognathus americanus* and *marginatus* and other *Telephoridæ* abound, and *Epicauta pennsylvanica* flocks to it. Better species are found in less numbers—*Malachidæ*, some *Chrysomelids* and *Lebia atriventris*, *grandis*, *pumila*, *viridis*, and *ornata* are not uncommonly found—several species of *Curculionidæ* frequent it, and last season I took hundreds of *Centrinus picumnus* which previously I had only taken

occasionally in the sweep net. General collectors will find many *Hymenoptera*, some *Hemiptera*, *Diptera* and various *Lepidoptera*.

Thistles will often repay search on their flowers. Some *Longicornia* frequent it, *Typocerus velutinus* being often common—*Leptura canadensis* and *bilineata* in smaller numbers and others occasional. *Trichius* is often found on it as well as others of the *Cetoniadae*.

The milk weed furnishes *Tetraopes canteriator* and *tetraophthalmus* *Chrysomela clivicollis* and several species of the *Coccinellidae*.

Last though by no means, least Chestnut flowers deserve attention. *Mordellidae* swarm on them, and last year three new species were taken by a collector at Ithaca N.Y. *Longicorns*, and *Curculionidae* frequent them and *Balaninus nasicus* is often found in numbers. Different sections of the country will of course yield different species, but allied species or genera can be pretty certainly counted on in similar situations, so that although each collector may not take precisely such things as I have taken, something similar is almost certain to be found.

COLLECTION NOTES.

By F. G. SCHÄUPP.

At North Branch, June 26th & 27th a very large swarm of the handsome and usually rare *Pomphopæa Sayi*, Lec, settled on the blossoms of the common locust, (*Robinia pseudacacia*), most specimens in copulation, and very sluggish, but after those two days all had disappeared and none have been seen since. Here, at North Branch the season is two weeks later than usual: this, in Botany is proved by the fact that Strawberries are just ripe, whereas the Raspberries which are now still green usually ripen about this date: it is proved in Entomology by the entire absence of many Longicorns formerly found at this time, while things I never saw here before are commonly collected. *Carabidous* larvæ also are still abundant which is unusual at this time.

Limenetis arthemis in former years very rare in July is now met with in numbers while *L. ursula* which has never before been seen here by me is now found with *arthemis*, in the proportion of two *ursula* to ten *arthemis*.

D. Palpi reaching to or exceeding middle of front.

§ Wings angulated.

Vestiture somewhat divergent; thorax with an elevated anterior crest: primaries with acute apices; outer margin excavated to middle, where it is produced.

Eucirroedia.⁷⁴

§§ Wings not angulated.

† Vestiture hairy with scales intermixed.

— divergent: thorax with prominent upright posterior tuft: abdomen conspicuously tufted; primaries broad.

Chytonix.

— flattened; smooth: collar somewhat projecting; thorax and abdomen untufted; the latter exceeding secondaries: primaries narrow.

Homohadena.

— coarse: thorax with posterior tuft: head sunken: primaries elongate, narrow, equal.

Pachypolia.⁷⁵

†† Vestiture hairy.

Thorax with anterior crest; palpi horizontal and but little exceeding the frontal tuft: primaries narrow, elongate, with depressed costal, straight inner margin, and acute apices.

Hoporina.⁷⁶

— with dorsal crest; collar somewhat produced at middle: palpi oblique, divergent, stout: wings elongate; apex of primaries acute.

Parastichtis.

— — a large saddle shaped tuft at base: abdomen tufted: palpi porrect; close to front: primaries moderate, sometimes with a tooth at hind angle.

Plusia.⁷⁷

Head sunken, palpi loosely held: collar produced in front: tufted as before, and in addition an exaggerated tuft on second abdominal segment: body pilose.

Behrensia.

Thorax quadrate; convex; with an elevated anterior crest: primaries widening outwardly with oblique outer margin.

Xanthia.

— without crest: primaries wide, sub-equal; outer margin nearly straight.

Orthosia.⁷⁸

Head retracted, vestiture coarse; clypeus usually with a corneous projection somewhat hood-like: abdomen short, conic, tufted.

Cleophana.⁷⁹

DIVISION C. EYES HAIRY.⁸⁰

I. OVIPOSITOR OF ♀ EXTRUDED.

♂ antennæ shorter than ♀: thorax stout, crested; collar elevated: abdomen exceeding secondaries by $\frac{1}{3}$ its length. ***Admetovis.**
Robust: thorax with anterior and posterior divided tuft; abdomen scarcely exceeding secondaries. **Mamestra.**⁸¹

II. OVIPOSITOR OF ♀ NOT EXTRUDED.

A. Antennæ in both sexes pectinated.

Thorax quadrate, projecting anteriorly at middle and sides: abdomen short, heavy; not exceeding secondaries: primaries elongate; outer margin oblique. **Perigrapha.**⁸²

—: *pategiæ* somewhat uplifted; thorax with divided anterior and posterior tuft: abdomen exceeding secondaries by nearly $\frac{1}{2}$ its length; loosely tufted; primaries narrow. **Eupsephopæctes.**

B. Antennæ in both sexes simple.

Thorax short; with posterior tuft and divergent *pategiæ*: wings large; widening outwardly, **Diphthera.**⁸³

— and abdomen untufted: head much retracted: wings short and rounded; secondaries white or yellow, with black margin. **Anarta.**

Head less retracted: vestiture rather loose: primaries narrow, sub-equal; outer margin straight; legs with long dense hair. **Zosteropoda.**

Vestiture smooth: primaries moderate, rounded; legs sparsely haired. **Orthodes.**⁸⁴

C. Antennæ of ♂ pectinate, serrate, or ciliate; of ♀ simple.

§ Primaries narrow, equal.

Thorax with divided tufts: abdomen strongly tufted: palpi very short **Xylomiges.**⁸⁵

§§ Primaries widening outwardly.

† Head retracted.

Palpi porrect: together with front, clothed with long, coarse, sparse hair. **Mythimna.**

— drooping; exceeding frontal tuft: vestiture coarse; Thorax convex. **Taeniocampa.**⁸⁶

— porrect, reaching middle of front: vestiture coarse, divergent: thorax very short, with elevated crest anteriorly: abdomen heavy, with loose tufts at base: primaries large. **Nephelodes.**⁸⁷

†† Head not retracted.

Primaries somewhat retreating at hind angles: thorax with anterior and posterior divided tufts: abdomen tufted; anterior tibia sometimes with a claw or two spines at tip; generally unarmed. **Mamestra.**⁸⁸

Thorax with collar projecting at middle, and an upright crest anteriorly: vestiture smooth; that of front, fine and wooly. **Leucania.**⁸⁹

Thorax untufted: frontal vestiture coarse: primaries narrow. **Himella.**

NOTES TO THE SYNOPSIS.

1. *Oxylos* Grt., and *Heliophilus*, Grt. I do not consider distinct from *Heliophilus*. I can see nothing in *Oxylos* which would suffice for a generic distinction, while *Heliophilus* is based on a peculiarity in venation which if it were equal in both sexes would authorize the separation; but the peculiarity is found in the male only, while the female is a true *Heliophilus* and is in nothing distinct from that genus. Mere sexual differences should never authorize a genus, unless there are some points in the other sex as well, which would suffice for a separation. In such case the sexual distinction would add to the value of the other characteristics.

2. Congeneric with this, are *Porrima* Grt., and *Rhodophora*, Guen. The former seems to differ in being rather more coarsely haired, more wooly beneath, having the primaries a little wider, and the fringes longer. The latter has the vestiture a little finer and the palpi slightly drooping instead of horizontal: there is also a very slight difference in the armature of the anterior tibia; but carefully compared with each other, the conclusion that they are identical is irresistible: not only do they agree in outline and general characteristics but even the coloration, slight as its generic value is, would seem to bring them together.

2½. Very unsatisfactorily distinguished from *Heliophana*, and probably identical with it.

3. I am unable to find any sufficient characters to separate *Shinia*, Hb., *Euleucyptera*, Grt. and *Triocnemis*, Grt., from this genus: there is a slight difference in the armature of the anterior tibia, in the former the primaries are very slightly broader, the fringes longer, and the ornamentation is apparently entirely different: close examination however reveals decided peculiarities common to all. Renewed examination leads me very strongly to the opinion that the genera I have grouped under *Alaria* also belong to this genus. The difference in vestiture is not so wide as to make the union indefensible, and the variations in other respects are very much less than in many other genera—*Heliophilus* for instance—taking those of Europe in connection with our American species. I have also preferred *Tamila* Guen. to *Shinia* Hb., although Huebner's genus has priority in point of time. The reasons for disregarding Huebner's genera have been set forth by Prof. Hagen and Mr. W. H. Edwards and to their publications I refer the student. For my own part I will say that in the course of my studies I have been put to so much inconvenience, and so much trouble by imperfect descriptions, that I shall never recognise a genus based only on a designated type, unless the description of the type contains the structural peculiarities, whereby the genus is distinguished.

4. *Parthenos* and *Allotria* I think must be united with *Catocala*. *Parthenos* differs so far as I can make out, only in the somewhat more cylindric abdomen and by the apex of the primaries which are very slightly pointed: these differences are too slight to authorize the genus, especially as many of the species of *Catocala* have the abdomen considerably more cylindric than conic. I am well aware that there is a difference between the life history of *Parthenos* and that of the *Catocalas* whose early stages are known, but so long as genera are based on structural characters peculiar to the imago, incongruities will occur. *Allotria* differs from *Catocala* by the absence of the tuftings and the somewhat heavier abdomen. In the smaller species of the latter genus however the tuftings become obsolete although as far as I know they are never entirely wanting: the most divergent *Catocala* however is so near to *Allotria* that it is possible to mistake the one for the other. Both *Parthenos* and *Allotria* are readily separable from *Catocala* by color; but color is not always a safe specific, much less a generic distinction.

5. *Parallelia* Hb., is I believe identical with this genus: it differs only by the slightly more oblique outer margin of primaries, and the longer and more slender terminal joint of palpi: neither of them sufficient to distinguish them generically. I retain Guenee's genus in preference to Huebner's, for the reasons already stated.

6. *Cloantha*, Bd. = *Actinotia*, Hb.

7. Embraces *Drasteria*, Hb. and *Lilosea*, Grt. I can find no generic difference whatever between *Euclidia* and *Drasteria*, while *Lilosea* differs only in the slighter form and rather narrower secondaries: the antennæ are also more decidedly pectinated, but neither of these points is sufficient to separate them generically.

8. *Xanthothrix Neumoegeni* differs considerably from *X. ranunculi* in the form of the clypeus and in some minor points: they may possibly be generically separated hereafter, and if so, *X. ranunculi* with excavated cylindrical clypeus must be retained as the type form of the genus.

9. *Stiria*, Grt., *Stibadium*, Grt., and *Plagiomimicus*, Grt. I do not consider generically distinct from *Basilodes*. All of these genera are based on a single species, and taken together they form a small group, decidedly divergent as far as the ornamentation is concerned, but agreeing so closely in structural characters that I cannot persuade myself to regard them as distinct. The squamation and form of the thorax and abdomen are alike in all: the legs agree, and so far as the palpi are concerned, the group is remarkably homogenous: in all they are roughly and somewhat divergently haired, and in all, the terminal joint is obsolete: the outline

Meso- and metathorax punctured beneath:

Outer basal foveæ larger, prothorax less narrowed behind, but more sinuate on the sides, dorsal punctures two..... 49. *lætulus*, Lec.

Prothorax very slightly narrowed behind, feebly or not at all sinuate on the sides: basal foveæ confluent, punctured:

Color dark metallic; hind angles of prothorax nearly rectangular, dorsal punctures two to four..... 50. *occidentalis*, Dej.

Color black, hind angles nearly rectangular, dorsal punctures two to four.

51. *corvus*, Lec.

Prothorax feebly narrowed behind, basal foveæ not confluent, outer one small but deep, dorsal punctures two; body beneath impunctured.

Prothorax as much narrowed before as behind; basal foveæ not punctured.

52. *cyaneus*, Lec.

Prothorax more narrowed in front:

Antennæ piceous at base..... 53. *texanus*, Lec.

Antennæ ferruginous at base..... 54. *Sayi*, Brulle.

Prothorax not narrowed behind, sides depressed, more widely towards the base: trunk punctured beneath:

Not polished, dorsal punctures four.

Outer basal foveæ distinct, color green or blue, or dull bronze, legs piceous or ferruginous..... 55. *lucublandus*, Say.

Outer basal foveæ wanting, color blue, legs ferruginous..... 56. *bicolor*, Lec.

More convex and shining; dorsal punctures three; feebly bronzed, legs piceous or ferruginous..... 56. *convexicollis*. Say.

G.

(Prothorax more or less narrowed behind, basal angles carinate, foveæ large and deep, bistriate, punctulate; elytra with three dorsal punctures, and long scutellar stria, sinuate near the tip, humeri dentiform; posterior tarsi with first joint feebly grooved on the outer side).

Prothorax strongly narrowed behind, angles rectangular prominent:

Larger, very shining, basal foveæ impunctured, elytra iridescent, striæ fine.

58. *ebenus*, Dej.

Smaller, basal foveæ punctulate, elytra more deeply striate. 59. *caudicalis*, Say.

Prothorax less narrowed behind, angles small rectangular, slightly prominent; basal foveæ punctured; elytral stria deep:

Still smaller, slender..... 60. *luctuosus*, Dej.

Broader and larger..... 61. *corvinus*, Dej.

H.

(Posterior tarsi with two or three joints grooved on the outer side; prothorax moderately narrowed behind, angles not prominent, basal foveæ linear deep; elytra with three dorsal punctures, scutellar stria long, humeral angles not dentiform, tip sinuate.)

Male with inner side of hind tibiæ clothed with hair; three tarsal joints grooved:

Color purplish, basal impressions of prothorax not punctured, hind angles rather obtuse..... 62. *purpuratus*, Lec.

- Color black, basal impressions of prothorax more or less punctured, angles small rectangular. 63. *mutus*, Say.
 Male with the hind tibiæ not hairy on the inner side; tarsal grooves less deep, not extending to the third joint; prothorax feebly sinuate on the side behind, hind angles rectangular, basal foveæ feebly punctured. 64. *lustrans*, Lec.

I.

- (Posterior tarsi with three joints grooved, though sometimes not very deeply; prothorax with basal impressions linear, more or less punctured, angles rectangular or obtuse not rounded; elytra with five or six large dorsal punctures, humeri not dentiform, tip deeply sinuate, scutellar stria long. Species indefinite and opinionative, especially in the differences between *orinomum* and *Luczotti*.)

Elytra in both sexes shining; hind angles of prothorax small, prominent, dentiform. 65. *pensylvanicus*, Lec.

Elytra of ♀ dull, of ♂ shining:

Sides of prothorax more broadly depressed:

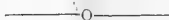
Sides of prothorax slightly sinuate behind, angles rectangular. 66. *vitreus*, Dej.

Sides of prothorax oblique, angles obtuse. 67. *orinomum*, Lec.

Sides of prothorax more narrowly depressed:

Sides of prothorax oblique, angles obtuse. 68. *Luczotti*, Dej.

Larger, prothorax more narrowly margined; sides slightly sinuate behind, angles rectangular. 69. *oregonus*, Lec.



DIVISION 4, *Elytra with dorsal punctures; palpi with the last joint elongate oval, scarcely truncate. (Small species.)*

Prosternum finely margined behind:

Episterna of metathorax elongate:

Scutellar stria wanting:

Prothorax rounded, broadly margined; dorsal punctures three. A.

Prothorax narrowed behind, finely margined; dorsal punctures two. B.

Scutellar stria long; dorsal punctures three; ARGUTOR. C.

Episterna of metathorax short, dorsal punctures four to six:

Scutellar stria variable; CRYBIUS. D.

A.

- (Posterior tarsi with four joints grooved on the outer side. Body oval elongate, head rather small, prothorax nearly square with very rounded angles, sides widely depressed towards the base, basal impressions single deep, impunctured.)

Shining black, antennæ, palpi, and legs ferruginous. 70. *erythropus*, Dej.

B.

- (Posterior tarsi with two joints grooved on the outer side. Body of usual form, prothorax narrowed slightly behind, angles obtuse not rounded, basal impressions double, outer one punctiform; scutellar stria punctiform; dorsal punctures two; prosternum margined at tip.)

Bronzed, antennæ, palpi and legs ferruginous. 71. *splendidulus*, Lec.

Biological notes on, and Description of the larva of *Calosoma calidum*, *Fab.*

By F. G. SCHAUPP.

July 5th I found a large carabidous larva in the ground entirely black. It was very fierce and active, biting very hard. I fed it with pupæ of *Ceruchus piceus*, which I found plentifully in a beech stump, it devoured daily about two. At one instance it devoured at one sitting the whole contents of a large pupa of *Smerinthus excaecatus*.

From July 14th till July 17th it was entirely motionless and transformed into pupa the latter day. Gradually it became dark, and July 25 the imago developed all white, except the above named parts which as well as the trochanters were black.

From 6 to 9 o'clock a. m. it became of full color.

Length of full grown larva 40 mm; form linear.

Color entirely black, shining.

Head rounded, somewhat broader than long, anterior angles small rectangular, hind angles rounded, clypeus sulcate at middle, carinate in front.

Ocelli six placed at the margin behind the antennæ, distant from each other.

Antennæ four-jointed, arising near the base of the mandibles and just as long as those, first joint stout, somewhat club-shaped, second twice as long, truncate at tip, third as long as the first, fourth half as long and slender.

Mandibles very long and broad with blunt tip, slightly arcuate with a very large broad blunt tooth situated near the base, and a small straight slender brush.

Maxilla with palpus as long as the antennæ, but much farther projecting; the last antennal joint scarcely reaches the tip of the mandibles, while almost three joints of the maxillar palpi project farther. Basal joint of maxilla short, second five times longer, a little broader at apex clothed with dense bristles, especially at the inner side, supporting a four-jointed palpus, a two jointed lobe and a small lobe-like process. The palpal joints are very short and stout, the fourth oblong oval and the longest; the lobes scarcely half as stout as the palpi, the two joints nearly equally long, and both together as long as the three first palpal joints; the process arises near the inner base of the lobe, is very slender and one-third the length of a lobal joint, set with bristles at tip.

Mentum small, four-toothed, broadly rounded anteriorly and triangularly pointed posteriorly; ligula with lateral sides subparallel, terminating into a truncate triangle with one seta at middle of apex and supporting the two-jointed stout labial palpus, first joint clavate, second oblong ovate, both longer and stouter than the maxillar palpus

Prothorax transverse, narrowed in front, broader than the head, sides margined.

Meso- and *Metathorax* shorter, than the prothorax, but broader, sides parallel with depressions near the anterior angles.

Scutes of abdominal segments 1-7 of nearly equal breadth with rounded angles, impressions and foveæ near the anterior angles, the posterior margin very broadly elevated; the hind angles of the eighth segment are rectangular, those of the ninth acuminate, anal fork straight with uneven outlines and three bristles on the outer side.

Legs set with interspersed spines.

Spiracles nine, those of the thorax much larger than the seven abdominal ones.

The pupa is yellowish white, 18 mm long, arcuate, very narrowed towards the apex, the five first abdominal segments are clothed above with a long brush of hair, the last segment has two sharp pointed teeth at the posterior margin, for the rest, it has the same general appearance as the other larvæ of Carabidæ.

Just while I was writing the above description, Mr. E. A. Schwarz of Washington had the kindness to send me his copy of Schiødte's Descriptions of larvæ, published in Kroyers Naturhistorisk Tidsskrift in Copenhagen.

At a former occasion I spoke in the BULLETIN of the excellency of the illustrations contained in this paper, but now I had the pleasure to read those elaborate descriptions, which are as excellent as the plates.

What an amount of work! With great trouble I succeed to raise every summer a few species from the larvæ, usually very rare; and I am unable to determine to what genus a larva may possibly belong and in Schiødte's work I find an excellent synopsis of the larval characters of about thirty genera of Carabidæ, as *Cicindela*, *Omophron*, *Elaphrus*, *Notiophilus*, *Nebria*, *Leistus*, *Cychrus*, *Calosoma*, *Carabus*, *Loricera*, *Scarites*, *Dyschirius*, *Anchomenus*, (*Platynus*) *Pterostichus*, *Broscus*, *Amara*, *Chlænius*, *Stenolophus*, *Bradycellus*, *Patrobus*, *Bembidium* etc.

and squamation of the head are almost absolutely identical; *Stiria* differing from the others in having the head somewhat retracted: the females all agree in having the ovipositor extruded. This leaves for generic separation only the shape of the wings, and the modifications of the clypeus. The wings in *Stibadium* and *Plagiomimicus* are alike: in *Basilodes* the outer margin is less oblique and slightly bulging at the middle: this makes the wings more ample, but does not authorize its separation generically: *Stiria* has a rudimentary tooth, somewhat like some *Plusias*, at the hind angle, and the inner margin sinuate. The clypeus in all has a naked cup-like depression, which in *Basilodes* and *Stibadium* is smooth: in *Plagiomimicus* the edges are raised and there is a corneous ridge at the inferior margin: in *Stiria* there is a tubercle at this point. I can find no other differences, and these for reasons elsewhere given I cannot consider as authorizing a generic distinction. It is to be remarked that the *Plusiade* to which these insects belong, vary considerably in the form of wings and in some other characteristics.

10. This genus I have not seen: it is based on a single species, and so far as it is possible to judge from the description, it seems to be identical with the foregoing: I have been able to find nothing in the description which would not as well apply to it, except the expression "costal margin depressed": this does not seem sufficient to separate them generically.

11. Mr Grote says of this genus, that middle and hind tibia are spinose: I have examined the legs of several specimens, removing them, and placing them on a slide for examination under the compound microscope, but I have entirely failed to discover any spinulations. I have therefore placed it in this section with considerable hesitation as it is of course possible that the spines were broken off all the specimens I examined although they were otherwise perfect.

12. Very unsatisfactorily separated from *Annaphila* Grt., by the projecting clypeus and coarser vestiture. The ocelli are also smaller, and less remote from the eyes: in all other respects the two seem to agree.

13. *In sensu Lederer*—*Ochria* Hb.: this genus differs from *Hydroecia* only by the conic frontal tubercle: this is not sufficient to separate it generically, but as I do not know *Gortyna* in nature, I prefer to leave matters as they are. It is to be noted however that some *Hydroecia* are aberrant, and more like the typical European *Gortyna* while from what Mr. Grote says of *Gortyna* (*Ochria*) *sanzalitzæ*, it is not to be separated from *Hydroecia* except by the frontal tubercle, and does not seem nearly related to the European species.

14. The palpi in this genus, Lederer says exceed the front: in the species I have seen, this is not the case. I have not seen all our species, but so far as my observations extend, the genus is correctly placed in the present sub-division.

15. *Charaara* Wlk., seems to be identical with *Raphia*: the primaries are less rounded and the thoracic vestiture is looser and more divergent, otherwise there seems to be no difference: I note however that the insects I have seen labelled *Charadra* do not appear to be congeneric, so that I am a little in doubt as to whether I really know the genus: Walkers description of the genus such as it is does not aid me.

16. Mr. Grote in his description of these genera does not say anything about the eyes or tibia, so that I am not sure that they belong here.

16½. *Sylectra* Hb. Guenee's genera where I have not myself seen them I am not very certain about, as his generic descriptions are very superficial.

17. Differs in several respects from *Hypena* though very closely allied to it, and perhaps on a comparison with all the exotic species it will be found a bad genus.

18. *Chytolita* Grt. I can find nothing whatever to authorize this genus. *Philometra serraticornis*, Grt., also belongs to *Herminia* if the specimen from Mr. Graef's collection is correctly determined: it is not congeneric with the *P. longilabris* of the same collection.

19. I am inclined to believe that *Renia* and *Herminia* are identical. I have not however examined the neuration and would not care to unite them at present.

20. I am not quite sure that this genus belongs here, for Mr. Grote does not describe the palpi. From its general characters I should suspect it to be *Herminia*. This however is a mere suspicion, based on an imperfect description.

21. Dr. Harvey in his description of this genus, says nothing of either the eyes or tibia: I presume that the former are naked and that the latter are unarmed, as the converse of this would probably have been stated. Comparing descriptions, it strikes me that there is no great difference between the two last mentioned genera, and they may be identical: unfortunately I know neither of them.

22. *Litognatha* Grt., is identical with this genus: the absence of the brush on the anterior tibia of the ♂ and the thickened ♂ antennæ, are certainly not generic distinctions and I can find nothing having a higher value to separate them.

23. From the description of this genus, I am convinced that it is identical with *Zanclognatha*. The genus is based on a single species which I have not seen, but the characters mentioned by Mr. Grote certainly do not seem to authorize it.

24. This ends the section *Deltoida* as far as this division is concerned. I am perfectly convinced that even with those genera that I have declared bad taken out, there are still too many; but not until such time as I have at least $\frac{3}{4}$ of all the species before me and *all* of the genera, can I say exactly how much the number should be reduced.

25. = *Aenigma* Strk.

26. I am not sure that this genus belongs here. I have not seen it, and the description is not so full as it might be.

27. *P. longilabris*: as already stated this insect is not congeneric with *P. serraticornis*, and approaches very close to *Pseudolimacodes*: differs in the narrower head, the flattened palpi, and the form of the wings as above mentioned,

28. = *Eutelia* Hb., Our species differ somewhat from the European, in the length of terminal joint of palpi and in having the primaries more distinctly angulated.

29. = *Salix* Hb.,

30. Congeneric with *Ypsia* are *Zale* Hb., *Pheocyma* Hb., and *Pseudanthracia* Grt. The only points of difference that I can find between these genera are the comparative size of the posterior thoracic tufts, the absence of all but the basal abdominal tuft in *Pseudanthracia*, and the comparative width of the primaries: none of them satisfactory distinctions. *Zale* is most strongly marked, having the thoracic tufts largest, and the primaries broadest, with rounded apex.

31. *Thysania* is scarcely sufficiently distinct, to be retained as separate; there are only two species (one of *Erebus* and one of *Thysania*) known in this country and both of them expand nearly 5 inches, and are our largest *Noctuids*. *Thysania* has the fringes of the wings more dentate, while in *Erebus* the secondaries are somewhat produced at middle: there is a little difference in the palpi and some in the vestiture but scarcely enough to separate them generically.

32. = *Pyrophila* Hb.

33. *Cirrhobolina* Grt., *Synedoida* Hy. Edw., and *Melipotis* Hb.; are not generically distinct from *Syneda*, and taken together, all these are separated from *Leucanites* mainly in not having the tibia spinose. *Melipotis* differs from *Syneda* in the stouter form, and more oblique outer

margin of primaries; the distinguishing mark of *Cirrhobolina* I have been unable to find. Mr. Grote has properly placed the genus between *Syneda* and *Melipotis*, for it seems to fill what slight gap there might otherwise have been between the two. *Synedoida* is a color genus only, and so Mr. Edwards seems himself now to believe.

34. = *Sudiaphora* Zell,

35. *Adipsophanes* Grt., does not seem to me sufficiently distinct from *Crambodes*. The somewhat longer abdomen, the want of a tuft on the basal segment and the slightly smaller secondaries are all that I can find to separate them.

36. *Spragueia* Grt. Our species of *Agriphila* appear to agree in all respects with the European species, and I can find no reason for separating them generically.

37. Appears to differ from *Acontia* in not having the scutellum inflated and overhanging the basal segment of abdomen; in other respects, and in ornamentation, the resemblance is exceedingly close. This entire group is very unsatisfactorily distinguished so far as structural characters go, but the genera can be very readily distinguished by the ornamentation, which is peculiar in each genus. *Trichotarache* Grt., differs from this genus in having a prominent bulging clypeus. In ornamentation it is so close to *Tarache* as to be practically identical, and I do not consider it as a good genus.

38. Guenee's description of this genus is not entirely satisfactory: he figures two species, one of which has a very prominent tooth at the hind angle and at the middle of hind margin of primaries while the other species has only a slight tooth at hind angle. I know neither.

39. *Cerma* Hb., and *Polygrammata* Hb., do not seem to differ from *Bryophila*. *Cerma* has a larger tuft on the abdomen, and *Polygrammata* lacks the thoracic tuft: otherwise they seem to agree very well.

40. *Eustrotia* Hb.

41. Very close to the preceeding, and possibly identical with it: the venation in this group however varies, and without a comparison in this respect I would not dare to unite them.

42. Very closely related to *Poaphila* from which it differs only in the vestiture, and shape of the primaries: neither of them very satisfactory distinctions. The ornamentation of the only species considerably resembles that of *Poaphila quadrifilaris*.

43. In part only: see Note 56 *post*.

44. Not *Uplexia*.

C.

(Posterior tarsi with three joints grooved on the outside; prothorax feebly narrowed behind, angles not rounded, basal impressions single, base finely margined each side.

Elytral striæ impunctured; hind angles of prothorax sub-rectangular, slightly prominent, antennæ and legs dark ferruginous. **72. patruelis**, Dej.

Elytral striæ punctured as far as the middle; form less slender, hind angles more distinctly obtuse; antennæ and legs dark ferruginous, thighs usually piceous. Striæ strongly punctured; *desidiosus*, Lec. Striæ indistinctly punctured.

73. femoralis, Kirby.

Smaller, very shining, iridescent, elytral striæ obsoletely punctured; hind angles of prothorax obtuse not prominent, antennæ and feet bright ferruginous.

74. corrusculus, Lec.

D.

(Posterior tarsi with three joints grooved on the outer side; body elongate, prothorax moderately narrowed behind, basal angles sub-rectangular, occasionally prominent, impressions single or double, in the latter case the angles are sometimes feebly carinated; elytra elongate oval, or subovate, usually convex, dorsal punctures two to six, but not very constant; humeral angles rounded, tip more or less sinuate, scutellar stria sometimes long, sometimes short, species in part opinionative and indistinct.)

Base of prothorax not margined near the hind angles; legs blackish.

Base of prothorax between fovea and angle convex, or at least not flattened; elytra convex, scutellar stria long, dorsal punctures small.

Elytral striæ fine, first and second striæ connected behind by a deeper hook: outer basal impressions punctiform, indistinct, hind angles nearly obtuse; brassy. **75. vindicatus**, Mann,

Elytral striæ deeper:

Black, basal foveæ of prothorax not punctured. **76. ventricosus**, Dej.

Bronzed, basal foveæ punctured. **77. subexaratus**, Mann.

Base of prothorax between fovea and angle flattened; elytra convex, scutellar stria, dorsal punctures.

Bronzed, hind angles of prothorax nearly obtuse, outer fovea wanting, inner one punctured. **78. pinguedineus**, Dej.

More brilliant green bronzed, hind angles rectangular. **79. hyperboreus**, Men.

Base of prothorax margined near the hind angles; legs usually ferruginous; scutellar stria generally short:

Outer basal fovea small, but distinct, angles not carinate:

Prothorax more narrowed behind, angles rectangular, sinuosity short.

80. hudsonicus, Lec.

Like preceeding, but smaller, less convex, sides of prothorax more sinuate, though less narrowed behind. **81. similis**, Men.

- Broader, and less convex, hind angles prominent, sides of prothorax more sinuate..... **82. fatuus**, Mann.
- Prothorax narrower, sides much less rounded and less sinuate towards the base.
83. surgens, Lec.
- Outer basal fovea longer, hind angles subcarinate, foveæ confluent, forming a depressed space:
Hind angles slightly prominent, elytral striæ rather deep. **44. riparius**, Dej.
Hind angles more prominent, sides more sinuate, elytral striæ finer, especially towards the sides and tip..... **85. confusus**, Mann.
- Outer basal fovea wanting, space from angle to fovea generally less flattened (thus resembling the species 75-77, but the base is margined towards the angle, and the feet ferruginous); elytral punctures strongly marked.
- Larger, hind angles of prothorax rectangular, small and not prominent.
86. subcaudatus, Mann.
- Middle sized, hind angles of prothorax rather prominent, or less prominent.
87. emptricola, Dej.
- Smaller, prothorax broader, comparatively more narrowed behind, sides suddenly sinuate, hind angles prominent..... **88. mandibularis**, Kirby.

BIBLIOGRAPHY.

Those species treated in *Leconte's Synopsis of Pterostichi*, Journ. Ac. Phila. 1853, pp. 225-256. are cited below: "*Lec. Syn.*"

1. *morionides*, Chd. Revue & Mag, de Zool. 1868. (Extrait) p. 57. Cal.—22-23 mm.
2. *tarsalis*, Lec. Proc. Ac. Phila. 1873, p. 311. Cal. Or.—16-19 mm.
3. *crenicollis*, Lec. ibidem. W. T., Vanc. Or.—17 mm.
4. *plactus*, Lec. Journ. Ac. Phila. 1852. II, 238. Or. Cal.—15 mm.
5. *herculaneus*, Mann. Bull. Mosc. 1843. II, 201. Sitka. Or. Vanc.—18 mm.
6. *validus*, Dej. Spec. III, 325.=*algidus*, Lec. Syn. 238, Alask. Or. W. T. Vanc. 14m
7. *protractus*, Lec. Proc. Ac. Phil. 1860, p. 319.=*inornatus*, Bland. Cal. Col. Utah. Nebr. Nev. Mont.—15-18 mm.
8. *vicinus*, Man. Bull. Mosc. 1843. II, p. 206.=*californicus*, † Lec. Syn. p. 238. Cal. 13-15 mm.
9. *longulus*, Lec. Proc. Ac. Phila. 1873. p. 312. Col. N. M.—11 mm.
- 10 *angustus*, Dej. Spec. III, 328.=*linearis*, Lec. Journ. Ac. II, 1852. p. 239. Cal. 7.5 mm.
11. *amethystinus*, (Dej.) Mann. Bull. Mosc. 1843. II, 201., Menetr. Bull. Ac. Petr. II, 1844. p. 58. (Dej. Cat.) Sitka. Oregon. W. T. Vanc.—11 mm.
12. *castaneus*, Dej. Spec. III, 326.=*brunneus*, Dej. Spec. III, 327. Alaska. 9-10 mm.
13. *scutellaris*, Lec. Proc. Ac. Phila. 1873. p. 312. Cal. Or.—9-11.
14. *californicus*, Dej. Spec. III, 222;=*ampliocollis*, Mots. Bull. Mosc. 1859. III, 146, =*simplex* Lec. Ann. Lyc. V, 181.=*muticus*, Lec. Cal.—11-14 mm.
15. *Menetriesi*, Mots. Bull. Mosc. 1845, IV, 341.=*ater*, || Mann. Bull. Mosc. 1843. II, 206. Cal.—22-23 mm.
16. *castanipes*, Men. Bull. Ac. Petr. 1844, II, 59.=*contractus*, Lec. Ann. Lyc. V, 182. Cal.—13.5 mm.

17. *Spraguei*, Lec. Proc. Ac. Phila. 1873. p. 313. Nev.—17 mm.
18. *gracilior*, Lec. l. c. p. 304.=*longicollis*, || Mots. Bull. Mosc. 1859. III, 147. Cal. Or. Nebr. Nev.—9-10 mm.
19. *Hornii*, Lec. Proc. Ac. Phila. 1873. p. 313. Cal.—14 mm.
20. *Isabelle*, Lec. Ann. Lyc. V, 182. Cal.—16.5 mm.
21. *congestus*, Men. Bull. Ac. Petr. 1844. II, 59.=*illustris*, Lec. Ann. Lyc. V, 182. Alaska, Cal.—12 mm.
22. *adoxus*, Say. Trans. Am. Phil. II, 1825. p. 46.=*tristis*, Dej. Spec. III, 324.=*interfector*, Newm. Ent. Mag. V, 387.=*sustentus*, Lec. Syn. 1852. 236.=*subarcuatus*, Lec. ibidem. 237.=*rejectus*, Lec. ibid. 236. N.Y., Ga., Can., Pa., Md., Va. D. C.—14-15 mm.
23. *longicollis*, Lec., Syn. p. 239.=*oregonus*, || Chaud. Rev. & Mag. de Zool. 1868, (Separatum) p. 55. Or.—8.3 mm.
24. *sphodrinus*, Lec. New Spec. I, 1863, p. 10. Nebr.—11 mm.
25. *grandiceps*, Chaud. Rev. et. Mag. Zool. 1868. (Separatum) p. 56. Western N. C. Northern Ga.—14-17 mm.
26. *rostratus*, Newm. Ent. Mag. V, 387.=*grandiceps*, Lec. Ann. Lyc. IV, 236. N.Y. S. & W. Sts.—14-16.3 mm.
27. *mancus*, Lec. Journ. Ac. Phila. II, 234. Ga.—11 mm.
28. *diligendus*, Chaud. Rev. & Mag. de Zool. 1866, (Separatum) p. 53. N. Y., Ills., Penn., Md.—12 mm.
29. *honestus*, Say. Trans. Am. Philos. II, 51.=*americanus*, Casteln. Etud. ent. p. 72.=*fastiditus* Dej. Spec. III, 323. N.Y., Atl. St., N. Scot., Ohio.—8 mm.
30. *lubricus*, Lec. Journ. Ac. Phila. 1853, p. 240. Ga.—8.8 mm.
31. *tumescens*, Lec. New Spec. I, 11. La. Tex.—8.4 mm.
32. *obscurus*, Say. Trans. Am. Philos. IV, 435; Lec. Ann. Lyc. IV 453, rare. S. & W. St.—12 mm.
33. *ventralis*, Say. Trans. Am. Philos. II, 46.=*cycloderus*, Chd. La. Mo. Ks. Fla.—8 8 mm.
34. *lachrymosus*, Newm. Ent. Mag. V, 386. N.Y., M. & S. Sts.—15 mm.
35. *coracinus*, Newm. ibidem.=*moerens*, Newm.=*adjunctus*, Lec. Syn. p. 245.=*flebilis*, Lec. ibidem. N.Y. Va. Tenn. Can.—13-16 mm.
36. *stygius*, Say. Trans. Am. Philos. II, 41.=*bisigillatus*, Harris;=*rugicollis*, Hald. Proc. Ac. Phila. I, 300. N.Y., Atl. Ohio. Ills.—13.9 mm.
37. *relictus*, Newm. Ent. Mag. V, 387.=*protensus*, Lec. New Spec. I, 12. N.Y. Pa., Lk. Sup.—16 mm.
38. *superciliosus*, Say. Journ. Ac. III, 141. N.Y. Pa., L. S.—15.3 mm.
39. *moestus*, Say. Trans. Am. Philos. II, 42. Pa. Atl. St.—15 mm.
40. *punctatissimus*, Ränd. Bost. Journ. II, 3. Me. Mass. Can. H B.—14 mm.
41. *agonus*, Horn. Trans. Am. Ent. Soc. VIII, 140. Alaska.—10 mm.
42. *fallax*, Dej. Spec. III, 321. Ga. Tex.—16.3 mm.
43. *sculptus*, Lec. Journ. Ac. Phila. II, 248.=*striatus*, || Dej. Spec. III, 390. S. & W. St.—14-19 mm.
44. *obesus*, Lec. Proc. Ac. Phila. 1873. p. 314. Ga.—10 mm.
45. *permundus*, Say. Trans. Am. Philos. IV, 426. Mo. Ills. Nébr.—15 mm.
46. *Hamiltoni*, Horn. Trans. Am. Ent. Soc. VIII, 139. Pa.—13.5 mm.
47. *subcordatus*, Lec. Ann. Lyc. V. 181. Cal., N. Mex.—11-12 mm.
48. *scitulus*, Lec. Journ. Ac. Phila. II. 1853. p. 254. Nebr. N. Mex. Utah.—10-12 m.

49. *laetulus*, Lec. New Spec. I, 10.=*occidentalis*,† Chd. Cal.
 50. *occidentalis*, Dej. Spec. III, 231.=*cursitor*, Lec. Journ. Ac. Phila. New Ser. II, 254.=*cursorius*, Lec. Ann. Lyc. V, 181. Cal. Nev.—9-12 mm.
 51. *corvus*, Lec. Proc. Ac. Phila. 1873. p. 307. (only the synopsis) Dakota.—12 mm.
 52. *cyanus*, Lec. Journ. Ac. Phila. New Series, II, 254. Mo.—12 mm.
 53. *texanus*, Lec. New Species I, 10. Tex.—15 mm.
 54. *Sayi*, Brulle. Silb. Rev. Entom. III, 277.=*chalcites*, Say. Trans. Am. Philos. II, 55.=*micans*, Chaud. Bull. Mosc. 1843. IV, 767. 56. Atl. & W. St.—9-12 mm.
 55. *lucublandus*, Say, Trans. Am. Philos. II, 55. Dej. Spec. III, 212.=*castanipes*, Kirby. Fr. Bor. Am. IV, 37.=*dilatatus*, Lec. Ann. Lyc. IV, 232.=*fraternus*, Say. Long. Exped. II, 270. U. S.—9-12 mm.
 56. *bicolor*, Lec. Ann. Lyc. IV, 232. Rocky Mts.—12 mm.
 58. *ebeninus*, Dej. Spec. III, 307.=*acutangulus*, Chd. Bull. Mosc. 1843. IV, 771. N.Y. Ills., La., Tex. Ohio.—11-13.5 mm.
 59. *caudicatus*, Say. Trans. Am. Philos. II, 56.=*nigrita*, Kirby. Fn. Bor. IV, 32.=*agrestis*, Bland. Md., Ohio. Can. Dakota, Nev., Or.—
 60. *luctuosus*, Dej. Spec. III, 284.=*abjectus*, Lec. Journ. Ac. Phila. II, 243.=*hamatus*, Harris. New Eng. Farm. 1828, p. 123. N.Y., M. S., Lk. Sup.—8.9 mm.
 61. *corvinus*, Dej. Spec. III, 281.=*subpunctatus*, Harris N. E. Farm. 1828, p. 123; =*tenebrosus*, Chaud. Bull. Mosc. 1837. VII, 30. N.Y., Ga., L. S., D. C., Nebr. 13.8 mm.
 62. *purpuratus*, Lec. Journ. Ac. Phila. 1853. II, 242. Ohio, Ills., Pa.—14.3 mm.
 63. *nitus*, Say. Trans. Am. Philos. II, 44.=*mososus*, Dej. Spec. III, 283.=*piceicornis*, Kirby Fn. Bor. IV, 33. Atl.—10-13 mm.
 64. *lustrans*, Lec. Ann. Lyc. V, 181. Cal.—12 mm.
 65. *pennsylvanicus*, Lec. Proc. Ac. Phila. 1873. p. 314. Pa. N.Y.—11 mm.
 66. *vitreus*, Dej. Spec. III, 320; Ic. III, 8. 140. f. 4.=*Macklini*, Lec. List. Col. 1863. p. 9; Sitka. Cal.—11.5 mm.
 67. *orinomum*, Kirby, Faun. Bor. Am. IV, p. 32. Lec. Agassiz. Lake Superior. 206.=*adstrictus*, Esch. Mem. Mosc. VI, 103. Dej. Spec. III, 319;=*oblongiusculus*, Motsch. Bull. Mosc. 1859. III, 319.=*obtusangulus*, Motsch. ibid. 150. Or. Alaska.—11 mm.
 68. *Luczotti*, Dej. Spec. III, 321.=*seriepunctatus*, Bull. Mosc. 1843, II, 204.=*oblongonotatus*, Say. Trans. Am. Philos. IV, 425. N.Y. Me. Can. Or. H.B. Nebr. 12mm
 69. *oregonus*, Lec. Proc. Ac. Phila. 1861. p. 339.=*colligatus*, Wlk. Or.—10-12 mm.
 70. *erythropus*, Dej. Spec. III, 240.=*nitidus*, Kby, Fn. Bor. IV, 29. N.Y. Atl. St. 8.3m
 71. *splendidulus*, Lec. New Spec. I, 10. Cal.—6.5 mm.
 72. *patruelis*, Dej. Spec. V, 759.=*bicolor*, Kirby. N.Y. M. St. L. S.—7.5 mm.
 73. *femoralis*, Kirby Fn. Bor. IV, 31.=*desidiosus* Lec. New Spec. I, 11.—W.S. 7.5m
 74. *corrusculus*, Lec. Proc. Ac. Phila. 1873. p. 314. N.Y., Mass.—5 mm.
 75. *vindicatus*, Mann. Bull. Mosc. 1853. III, 129. Kadjak, Alaska.—9-10 mm.
 76. *ventricosus*, (Dej.) Esch. Mem. Mosc. VI, 186 Fisch. Ent. Russ. II, 132. t. 19. f. 6. Dej. Spec. III, 329.—8 mm.
 77. *subexaratus*, Mann. Bull. Mosc. 1853. III, 128. Alaska. Ft. Michael.—7 mm.
 78. *pinguedineus*, Dej. Spec. III, 330. Isl. St. Paul, Unalaska.—7-9 mm.
 79. *hyperboreus*, (Men.) Mann. Bull. Mosc. 1853, III, 127. Alaska.
 80. *hudsonicus*, Lec. New Species. I, 11. H.B.—7-9.5 mm.
 81. *similis*, Mann. Bull. Mosc. 1852. II, 296. Motsch. Kaefer Russl. p. 55. =*quadricollis*, Mann. Bull. Mosc. 1853, III, 133. Motsch. Kaefer Russl. p. 55.
 82. *fatuus*, Mann. Bull. Mosc. 1853, III, 130. Kadjak.—7-8 mm.
 83. *surgens*, Lec. Bull. U.S. Survey, 1878. IV, prt. 2. p. 449, Col.—8.5 mm.
 84. *riparius*, Dej. Spec. III, 332. Sitka. Kadjak.—7 mm.
 85. *confusus*, Motsch. Schrenk. Reise. 1860, p. 93, t. 6. f. 16, Kuril Isl.—7 mm.
 86. *subcaudatus*, Mann. Bull. Mosc. 1853, III, 132, Kenai Isl. St. Paul.—8 mm.
 87. *empetricola*, Dej. Spec. III, 331.=*frigidus*, Dej. Alaska.—7 mm.
 88. *mandibularis*, Kirby. Fn. Bor. IV, 31.=*fastidiosus*, Mann. Bull. Mosc. 1853, III, 131. Alaska, H. B., Can.—7 mm.

45. *Callopistria* Hb.
46. To this genus belongs the *Diphthera fallax* of Mr. Grote's catalogue. *Diphthera in sensu* Lederer is an entirely different genus.
47. The species of this genus known to me I do not consider as belonging to *Bryophila*, in which they have been placed in the late checklist.
48. In part only: the majority of the species belong to the next section.
49. Very unsatisfactorily divided from *Hadena*: there is only a single species, common to both continents, and it differs from *Hadena* in nothing but the tuftings: the difference in this respect however is so remarkable that the genus is immediately recognized: Still I scarcely consider it as of a generic value.
50. *Phlogophora* Guen., in part. Right here probably should come *Consercula* Grt, a genus which I don't know, but which is based on *Phlogophora anodonta* Guen. None of the gentlemen to whom I have written or whose collections I have examined know anything of this genus, nor could they inform me where it is described and I for my part have been unable to find anything concerning it except as above set forth.
51. *P. carneicosta* has some flattened hair intermixed.
52. *Eutricopis* Morr. I think belongs to this genus. I have the type, from Mr. Tepper's collection, and except the somewhat lighter form, and convex margin of primaries, I can discover no difference unless it be in the palpi, which in *Eutricopis* are shorter, more slender, and clothed with longer hair than in *Melicliptria*. The difference such as it is, has not a generic value. A more misleading name by the way than *Eutricopis* as applied to *nexilis* it would be difficult to find.
53. *Ipimorpha* Hb.
54. *Pyrrhia* Hb. Three American species are described of which I know only *C. umbra*. Of the European species some have the anterior tibia spined at tip and others have a corneous clypeal projection; none of our species I believe are so distinguished.
55. *Gortyna* Hb.
56. *Apatela* Hb. The majority of the species belong to this section, the other have been already alluded to. Some very divergent forms have been placed in this genus, and it will probably have to be very radically worked over before it can be regarded as a "pure" genus.

57. I am unable to see why this genus should be retained as distinct from *Hadena*: the differences are so unimportant that a generic separation seems perfectly unjustifiable.

58. The species described under this generic name are sadly in need of revision: a considerable number have lashed eyes, and they can not remain in this genus. If the insect in Mr. Neumoegen's collection labelled *Pachypolia atricornis* is correctly determined, some of them will find a place in the latter genus.

59. Except in the slighter form, and somewhat less wooly clothing beneath, *Copihadena* does not differ from *Metahadena* and I can find no sufficient reason for retaining the former genus. The agreement in armature of tibia, the form of collar and general resemblance otherwise is so great that I have no hesitation whatever in declaring them identical.

60. The armature of the anterior tibia in this section unless otherwise stated, consists of a single strong claw.

61. Mr. Grote has already united *Anytus* with *Agrotis*, and he has been followed in the Check-list of the Brooklyn Entomological Society. The lashed eyes sufficiently distinguish it from that genus, and I consider it distinct.

62. The same remarks apply to this genus. I have not seen it, but judging from the description it is very close to *Anytus*.

63. When not otherwise expressed, the armature consists of a single strong claw.

64. *Valeria Grotei* Morr., is the only N.A. Species hitherto described: it differs from the European Species in the armed fore tibia, narrower wings, and more slender, longer abdomen: possibly it is not congeneric with the European species.

65. *Euhypena* Grt., and *Meghypena* Grt., have been correctly referred to this genus by Mr. Grote himself. *Macrohypena* was also so referred, but I think it sufficiently distinct generically.

66. *Abrostola* O., is hardly sufficiently distinct from *Plusia*, and is united with it by the Continental Entomologists. The majority of the species belong to the present section, but in a few species the palpi are not so long, and the genus is therefore again referred to in another place. *Abrostola* agrees with the above diagnosis.

67. Mr. Grote in his description of this genus says that there are no ocelli: I find them present, but they are small, and concealed in the heavy vestiture of the head.

68. *Ablepharon* Grt.

69. Some of the European species have the clypeus modified, but I believe none of our species are so distinguished.

70. Three American species are described: of these *D. stigmata* is congeneric with the lashed eyed *Hadenas* and is certainly not a *Dryobota*, *D. opina* would be more correctly placed in *Valeria*: the other species I do not know.

71. *Lithophana* Hb.; *Litholomia* Grt., is also insufficiently distinguished from this genus.

72. *Lithomia* Hb., does not seem to differ from this genus. The thorax is not so much depressed, or so decidedly bounded; otherwise they are alike.

73. *Glaea* Hb. Careful comparison of a large number of species from both Continents has convinced me that *Scopelosoma* does not differ generically from *Orrhodia*. The only difference between them that is worth noting, is in the vestiture of the front. This, in *Orrhodia* is wooly and equal; smooth: in *Scopelosoma* it is coarse, and forms two broad super-incumbent tufts: this is a very small point upon which to base a genus, although it can be readily distinguished from *Orrhodia* thereby *Homoglaea* Morr., seems to unite them so far as the slight differences in the wings are concerned, but it has the smooth frontal vestiture of *Orrhodia*.

74. Possibly identical with *Cirroedia* in which the eyes are not lashed: although I am pretty certain that in *Euc. pampina* the eyes are lashed, I may be mistaken: at all events the lashes are very short.

75. In Mr. Neumoegen's collection there is an insect labelled *Pachypolia* in Mr. Grote's handwriting. It does not quite agree with the description of the genus, but if the specimen is correctly named, it is congeneric with *Dryobota stigmata*, and the lashed eyed *Hadenas*.

76. *Iodia* Hb., there are but two species known, one in Europe, the other in America. In the former the palpi are rather longer, and with the pointed frontal tuft form a snout: the thoracic crest is exaggerated, but in all other respects it agrees with the American species.

77. A section only. See note 66.

78. The difference between *Xanthia* and *Orthosia* is exceedingly attenuated, and it would hardly be doing violence to systematic classification to unite them. The thoracic crest, which is a distinguishing feature is present in some species of *Orthosia* and the difference in the cut of the primaries is very unsatisfactory as a generic distinction.

79. An exceedingly variable genus. There is but a single American species described, and this I don't know: I am unable to say therefore in-

to which particular section of the genus this species falls; one of the European species has the anterior tibia armed.

80. This division is remarkably compact; all the genera agree in the lack of tibial armature, and of clypeal modification: the vestiture is alike, and there is little difference in the palpi; this leaves only tuftings and antennal characteristics: neither of them very satisfactory.

81. In part only: the species belonging here were formerly classed as *Dianthoeicia*. Mr. Grote has lately incorporated the species with *Mamestra*, as I believe correctly.

82. Mr. Grote has referred his genus *Acerra* to *Perigrapha*. I presume he is correct.

83. I am in doubt whether there are any American species of this genus. The *D. fallax* of Mr. Grote's Catalogue belongs to *Moma* and the species placed in this genus in the Brooklyn Entomological Society's Check-list I believe to be incorrectly so placed.

84. *Pseudorthodes* Morr. is not generically distinct. It differs only in the longer wings, and in sexual peculiarities which do not suffice.

85. *Morrisonia* Grt., does not I think differ from *Xylomiges*.

86. *Graphiphora* Hb. *Crocigrapha* Grt., do not differ very markedly from *Taeniocampa* and I do not consider it distinct.

87. *Tricholita* Grt., is not sufficiently distinct to warrant its retention as a separate genus.

88. In part only: see note 81 ante.

89. *Heliophila* Hb.

90 and last. It remains now only to note those genera not mentioned in the synopsis, and those described subsequent thereto; and taking the last first we find

Epinyctis, Grt. Can. Ent. Vol. XIV, p. 75.

"Vestiture scaly. Eyes naked. Labial palpi short. Front full without excavation or tubercle: infra clypeal plate prominent. Tibia non-spinose; fore tibia short, with a claw. Thorax and abdomen untufted. Antennæ simple. Cut of the wings something like *Cucullia*. Primaries narrow and long, apices pointed; external margin oblique, even; the wings satiny white."

The species, *notatella* must remarkably resemble *Nycterophæta Magdalenæ*, Hulst, but the genus is readily distinguished, as a reference to the diagnosis of *Nycterophæta* in the synopsis will show. Closely allied however the two certainly are.

POCONUS, Dej.

Dr. Horn classifies them Trans. Am. Ent. Soc, V, 249. as follows:

Mentum tooth deeply notched; ligula with a single bristle at tip.

Epilobes of mentum acutely toothed; elytra with distinct basal marginal line, scutellar stria and three punctures on the outer side of the third interval. **texanus**.

Epilobes of mentum obtuse. Thorax cordate, form elongate, parallel. Elytra with feeble basal marginal line and scutellar stria and dorsal punctures as in **texanus planatus**.

Mentum tooth shorter and broader, feebly emarginate, ligula bisetose at tip.

Epilobes of mentum obtuse. Form of **planatus**, thorax not narrowed at base; prosternum broadly sulcate; scutellar stria absent; basal marginal line obliterated at middle, forming at the humeri a moderately elevated recurved carina; stria obliterated at base. Two dorsal punctures only, one median on the outer side, the other one-fourth from the apex on the inner side of the third interval. **Lecontei**.

P. texanus, Chaud, Revue. Mag. Zool. 1868, p. 64, Tex.—7-8 mm.

P. planatus, Horn,=*depressus*, || Lec. Trans. Am. Ent. Soc. 1874, p. 44, Cal. 5.5-7mm.

P. Lecontei, Horn,=*parallelus* || Lec. loc. cit. Tex.—5.5mm.

PATROBUS, Dej.

(From Trans. Am. Ent. Soc. 1875, p. 130 see also l. c. p. 248.)

Dr. Horn tabulates the species as follows:

Disc of thorax convex, hind angles with a rather deep fossa; head behind the eyes constricted.

Last two joints of maxillary palpi equal. **longicornis**, Say.

Last two joints unequal, terminal longer. **septentrionis**, Dej.

Disc of thorax flat, subquadrate, hind angles depressed without fossa; head not or very feebly constricted behind the eyes; terminal joints of maxillary palpi equal.

Hind trochanter ♂ one-third the length of the femora and not differing from that of the ♀ **rugicollis**, Rand.

Hind trochanter ♂ nearly half the length of the femora and acute at tip, that of ♀ normal. **aterrimus**, Esch.

Hind trochanter ♂ nearly as long as the femora, at tip slender and very acute, that of the ♀ scarcely differing from the ♀ ♀ of the two proceeding.

californicus, Motsch.

P. longicornis, Say. Trans. Am. Philos. Soc. II, 40;=*americanus*. Dej. Spec. III, 34. N.Y., Can. to Texas.—12-15 mm.

P. septentrionis, Dej. Spec. III, 29; Jc. 2, t. 106, f. 2.—Schaum. Nat. Ins. I, 377.—Schoenh. Dej. Cat. 3 ed. p. 32;=*hyperboreus* Dej. Spec. 3, 30;=*fossifrons*, Esch. Mem. Mosc. 1823 VI, 104;=*foveicollis*, Esch. Mem. Mosc. 6, 105;=*longiventris*, Mann. Bull. Mosc. 53, III 145;=*tenuis*, Lec. Ag. Lake Sup. 1850, p. 207;=*rufipes*, Lec. New Species. I, 1863, p. 18. America and Europe.—10 mm.

P. rugicollis, Rand. Bost. Journal, II, 1. N.Y., Pa., Mass. and northward.—11-12mm

P. aterrimus, Dej. Spec. III, 32; Esch. Dej. Cat. 3ed. 32;=*fulcratus*, Lec. Ann. and Mag. Nat. Hist. 1869. Ser. 4. Vol. IV, 374. Col. and N.W. to Alaska.

P. californicus. Motch. Bull. Mosc. 1859 III, 123. trochantericus Lec. Ann. and Mag. Nat. Hist. Ser. 4. vol. IV, 375. Cal.—11-15 mm.

P. fulvus, Mann. Bull. Mosc. 1853, III, p. 145, from Kadjak and *P. angusticollis*.

Mann. l. c. p. 146. are unknown; the two species *P. obtusiusculus*, Chaud. Ann. Soc. Belg. 1871, XIV, 43 from Hudson Bay and *P. stygicus*, Chaud. l. c., p. 46. Newfldld. (are most likely intermediate forms of septentrionis.)

ANOPHTHALMUS, Sturm.

Dr. Horn tabulates them (Trans. Am. Ent. Soc. III, 329,) as follows:

Penultimate joint of maxillar palpi longer than the last joint.

Base of elytra obliquely prolonged, thorax much longer than wide, hind angles rectangular, base truncate, body glabrous. **Tellkampfi**.

Penultimate joint equal to or even slightly shorter.

Elytra shining, not pubescent, thorax longer than wide.

Hind angles of thorax strictly rectangular, base squarely truncate.

Elytra elongate oval, feebly convex, striæ obsolete. Form slender. **tenuis**.

Hind angles acute, slightly prominent, base distinctly prolonged at middle.

Elytra broadly oval, more convex, striæ moderately deep and punctured. Form robust. **Menetriesi**.

Elytra subopaque, distinctly pubescent, thorax as wide or wider than long.

Elytral base never obliquely prolonged.

Sides of thorax gradually narrowing to base, scarcely sinuate, hind angles rectangular or nearly so, but never acute and prominent.

Thorax at base as wide as long. **eremita**.

Thorax at base narrower than long at widest portion not wider than long **pusio**.

Sides of thorax sinuately narrowing to base, hind angles acute prominent outwardly. Elytra very distinctly pubescent. **pubescens**.

A. Tellkampfi, Erichs. Muell. Arch. 1844. p. 384. note. Ky.—6.5–7.5 mm.

A. tenuis, Horn, Trans. Am. Ent. Soc. III, 327. So. Inda.—4.5–6 mm.

A. Menetriesi, Motsch. Etud. Entom. 1862, p. 41.—=*angulatus*, Lec. Ky.—5–6 mm.

A. eremita, Horn, l. c. pag. 328. Wyandotte Cave, Inda.—5 mm.

A. pusio, Horn, Trans. Am. Ent. Soc. II, 125. Erhart cave, Montgomery Co, Va. 2 m.

A. pubescens, Horn, l. c. p. 126 Cave city cave Ky.—4 mm.

Two old species of Motschoulsky *striatus* and *ventricosus* described in Eutdes entom. 1862. pp. 41 and 42 have been inserted in our check-list (Nos. 7574 and 7575). Hubbards *A. interstitialis* seems to me quite distinct.

TRECHUS, Clairv.

Dr. Horn classifies them (Trans. Am. Ent. Soc. 1876, p. 131). as follows:

Elytra oblong, twice as wide as long, five or six stria moderately well impressed. **rubens**.

Elytra oblong oval, with distinct humeri and four or at most five striæ, the inner three moderately well, and the outer two very feebly impressed. **chalybaeus**.

Elytra broadly oval, the striæ nearly obsolete, sometimes with the two nearest the suture feebly distinct. **ovipennis**.

T. rubens, Fab. Ent. Syst. I, 140. Northern Europe and Nova Scotia 5mm.

T. chalybaeus, (Mann.) Dej. Spec. V, p. 17.—=*californicus*, Motsch. Bull. Mosc. 1845.

IV, 347.—=*micans*, Lec. Ann. Lyc. IV, 314.—=*fulvus*, Lec. l. c. 315 (immature)

Alaska, Cal., Or., N.H., L.S.—5 mm.

T. ovipennis, Motsch. Bull. Mosc. 1845, IV, 348.—=*laevigatus*, Lec. (List.) Cal. 5mm.

Synopsis of the Lucanidae of the U. S.

By CHAS. FUCHS.

The insects of this family live on the sap of trees, such as beech, maple and oak, and pass through their transformation in decaying wood. Closely related to the *Scarabidae* this family can be readily separated from it by the antennal club, which in the *Scarabidae* is *lamellate* or leaf-shaped and movable, while in the *Lucanidae* it is merely *pectinate* or comb-toothed, and comparatively immobile.

THE GENERA MAY BE DISTINGUISHED AS FOLLOWS:

Mentum entire, ligula enlogated, behind or at the apex of the mentum.

Antennæ geniculate; anterior coxæ approximate.

Elytra smooth or obsoletely striate (in *mazama*)..... **Lucanus.**

Elytra striate and punctate.

Eyes decidedly notched by the margin of the head..... **Dorcus.**

Eyes scarcely or not at all notched..... **Platycerus.**

Antennæ straight, anterior coxæ contiguous.

Body moderately convex, head of ♂ as broad as thorax, elytra striate with intervals punctured..... **Ceruchus.**

Body cylindrical, head much narrower than thorax, elytra rugose.

Sinodendron.

Mentum deeply emarginate, ligula broad, filling the emargination.

Passalus.

Lucanus, Lin.

Mandibles of ♂ as long as abdomen..... **elaphus.**

Mandibles of ♂ as long as the thorax.

Mandibles with one tooth at middle.

Elytra smooth, femora yellow or reddish, head of ♂ broader than thorax..... **dama.**

Elytra finely punctulate, femora black, head of ♂ not broader than thorax..... **mazama.**

Mandibles ♂ with several, ♀ with two teeth, head of ♂ not narrower than thorax... **placidus.**

1. **elaphus**, Fab. Syst. Ent. p. 2, Olivier Ent. I, 12. t. 3, f. 7, *curvus*, (var.) De Géer. Mem. Ins. IV, 33, *americanus*, Hope Cat. Luc. p. 10. The ♂ is easily distinguished by the very long mandibles; the ♀ differs

by the black legs from *dama* Fabr. (*capreolus*, Lin.) which has brown legs (especially light femora) and by the chestnut-brown color of the upper surface from the ♀♀ of *placidus* and *mazama* which are black. Occurs in N. C., Va., Ills., Ind Terr. Length of ♂ 34-55m.



Fig. 1

The mentum in the ♀ *claphus* is comparatively longer, the anterior angles are very much less rounded and the part as a whole much more quadrate than in the ♀ *dama*.

The antennæ fig. 1 are geniculate as are all the others of this genus; in the ♂ they are more slender than in *dama* or any other of our American species: the joints are proportioned as in the figure, and the sixth joint shows no trace of dilatation; the joints except the terminal three are entirely glabrous, minutely punctulate, and set with a few sparse hair: the 7th joint is produced inwardly, forming the first of the pectinations; the 8th and 9th are longer, glabrous at the outer side but the inner side brown opaque, densely clothed with fine hair: the terminal joint is entirely opaque and densely pubescent: the form of the joints is better shown by Mr. Smith's excellent figure, (Fig. 1) than any description of mine can do.

2. *dama*, Fabr. Syst. El. II, 248. Thunberg Mem. Mosc. 1806. p. 198. *capreolus*, Lin. Mus. Lud. Ulr. p. 32., Oliv. Ent. I, 1. p. 15. t. 2. f. 4. ♂, t. 3. f. 4. ♀; *muticus* ♂ Thunb. l.c., p. 205. *trigonus* ♀ Thunb. l.c., p. 200, t. 12, f. 4. The only species with very light brown femora. Quite common in N.Y., Pa., Ills., D.C.—Length 23-35 mm.

The larva of this species lives in beech and oak, it is 1½ inches in length, of the usual *Scarabid* form, curved inward, of a whitish color more or less discolored by the contents of the intestines; the *stigmata* and head are luteous, the mandibles piceous: the figure on the plate shows the general appearance of the larva better than any description: the mandibles are strong, corneous, curved, with a prominent tooth near base, two small denticles on the inner side of the curve and three very distinct and strongly marked teeth at tip. The antennæ are moderate, 4 jointed the second joint longest, the first less than one half as long, third one-third shorter and dilated at tip: terminal joint very small, set at the inner side of the third joint: A few rather stout hairs on each joint: the mouth-parts are all stout fleshy: the maxilla is moderate, heavy, as usual in the scarabidæ; the palpus 4 jointed short, the joints nearly equal in length but gradually

decreasing in thickness, the terminal being conical and terminating in a blunt point, the lobes are thick, terminating at tip in a corneous, acute, curved process: the inner side being densely set with equal spinules rather than hair: the *ligula* is thick, densely set with spine-like hair, a small tubercle bearing two longer hairs in the centre, and the two-jointed palpi at sides: the legs are short, fleshy, densely set with long strong spines.



Fig. 2

The antennæ of the ♂ imago are stouter and comparatively shorter than in *elaphus* the club is heavier, more compactly set, proportioned as shown in figure 2, joint six is dilated at tip and shows an incipient pectination; joints 1 to 6 are entirely glabrous, joint 7 has the prolongation only opaque pubescent, while 8 to 10 are entirely opaque and pubescent. The ♀ differs in having the 7th joint entirely glabrous, and in the somewhat heavier joints of the club.

3. mazama Lec. (Dorcus) Proc. Ac. Phila. 1861. p. 345. The labrum of ♂ is rectangular and about four times broader than long; the thorax is distantly punctured and nearly smooth at disc; near the suture of elytra are two striae, obliterated toward apex.

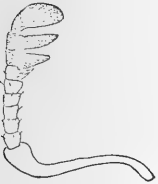


Fig. 3

The ♂ antennæ are still shorter than in *dama*, the joints 1 to 6 glabrous, 6 a little dilated; 7 glabrous at outer side only, prolongation half as long as in 8 and opaque pubescent, 8 to 10 entirely pubescent, opaque. This species is found in New Mexico, Utah, Arizona. Length

24 to 32 mm.

4. placidus, Say. Journ. Ac. Phila. V, 202. *lentus*, Casteln. Hist. nat. II, 171. The elytra and the thorax are more distinctly punctured, than in any of the other species, heavy mandibles, rectangular at the base and only curved at tip while the other species have them more equally rounded; near the middle tooth of mandibles, there are in the ♂ three, in the ♀ two smaller ones. Ills., Penn. 25-35 mm.

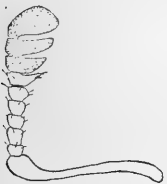


Fig. 4

In this species the club constitutes half the length of the antennæ excluding the 1st joint: proportioned as shown in fig. 4., joint 6 is dilated at middle on the inner side, joint 7 is prolonged inwardly nearly as long as 8; 8, 9 and 10 are opaque pubescent: the terminal joint is heavier and shorter than in any other species: there appears no notable difference between the sexes.

DORCUS, *Mc Leay*.

5. parallelus, Say. Journ. Ac. Phila. III, 248, var. *costatus*, Lec. Proc. Ac. Phila. 1856, p. 380, var. *brevis*, Say, Journ. Ac. Phila. V, 202; *parallelipipedus*, Voet. Col. II. p. 37, t. 30, f. 7. (*Voeti*. Schoenh. Syn. Ins. I, 3. p. 326.) *D. parallelus*, varying very much in size from 15 to 26 mm, has the elytra deeply striate and punctate, the striæ in the ♀♀ deeper, the mentum in the ♂ strongly transversely striate, in the ♀ variolose rugose; the anterior tibiæ are more serrate than those of the Lucani; *costatus*, Lec. has the striae more obliterated.

Regarding the variety of *brevis* Say, there is still considerable difference of opinion as to whether it really is entitled to rank as a species. It differs from *parallelus* in the smooth elytra, and the remarkable development of the head and thorax: the head being broader and nearly as long as the thorax, though the mandibles are not in proportion to this development. The insect is exceedingly rare, and while I am inclined to believe in its specific distinctness from *parallelus*, Dr. Horn strongly insists that it is only a variety, basing his opinion upon analogous variations observed in foreign species. In deference to his opinions based on a wider acquaintance with the family than we can boast of, *brevis* is here brought in as a variety. All the specimens of this variety have been found in New Jersey so far as we have been informed. This would seem to make it, if a variety at all an exceedingly local one, and curious and interesting for that reason. Mr. Charles Wilt of Philadelphia has a fine set of four beautiful specimens.



Fig. 5

The antennæ are peculiar: joint 1 to 5, as usual glabrous; joint 6 glabrous and somewhat dilated, joint 7 glabrous, and only slightly prolonged inwardly, joint 8 acutely prolonged, prolongation only pubescent, opaque, joint 9 with prolongation only pubescent, form as shown in figure, joint 10 spherical entirely pubescent. The mode of affixion to the *pedicel* is different from that of any other in the group, and a very decided groove extending longitudinally on the inner and upper side would seem to indicate that the clavicle was or could be folded upon it.



The larvæ live in lime trees and sugar maple and develop during July and August. The pupæ of the ♂ have a spiral appendage between the anal fork, see fig. 5 a. Found in N. Y., S. C., Tenn., Md., Penn. Length 15-26 mm.

Capis, *Grt.* Can. Ent. Vol. XIV, p. 20.

Antennæ simple. Ocelli. Labial palpi moderately projected, 3rd article short, a little depending. Form and outline of *Sisyrhyphena* but the wings shorter and broader.

These are all the structural points given by Mr. Grote. and my views of the genus or its description have been given at p. 100, Vol. XIV, Can. Ent.: Mr. Grote's reply to these views adds, eyes naked, tibia not spinose: the omissions are still too many to place the genus.

These are all that to my knowledge have been described since the synopsis went into type.

Those that I have omitted are as follows:—

Argillophora, *Grt.* Bull. Buff. Soc. Vol. I, p. 124.

"Ocelli. Antennæ simple, scaled, pubescent in both sexes. Labial palpi porrected, curved, closely scaled, held apart from but not exceeding the front, divaricate. Wings rather wide and subangulate. Fore wings roundly produced opposite median nervules, below which the external margin is cut inwardly to internal angle. Hind wings with rather determinate apices, full about median nervules and a little inwardly cut before anal angle. Primaries 12 veined, * * * *. Hind tibia with double spurs. Body linear; abdomen exceeding the secondaries, with very minute dorsal tufts."

Compared to *Spargaloma*. The omitted part of the description contains a minute detail of the neurulation, which seems to present no striking peculiarity. The other characters given are not sufficient to enable me to place the insect into its proper place in the synopsis, and I have never seen it.

Eucoptocnemis, *Grt.*

Eyes naked with hairy lashes. Antennæ strongly bi-pectinate: front rounded "with a navel shaped knob:" tongue present but short: head drawn in: palpi nearly horizontal, only reaching to about the middle of the eyes. Thorax stout, rounded and untufted. Abdomen untufted, reaching to the posterior wings. Anterior tibia armed on the outside, and at the junction with the tarsi with a long spine; on the inner side there is a row of shorter spines, also terminating in an inner one at the tarsi, resembling that on the outside, but considerably smaller. Middle and posterior tibia strongly spinose.

This description I did not obtain until too late to incorporate it in the synopsis, nor do I recollect exactly where I obtained it, having failed to make a note of it. The genus is founded on *Heliothobus fimbriaris*,

Guen., and was originally created by a mere designation of the type (See Can. Ent. Vol. VII, Morrison's letters and Grote's reply.)

Conservula, Grt., was created in the same way, (Can. Ent. VII, p. 99) and is not entitled to recognition unless subsequently described: I have been unable to find any description, and none of the gentlemen to whom I have applied for aid, could give me any information concerning it. Mr. Grote in a letter assures me that it is described but that he does not recollect where; he adds that it differs from its allies *Brotolomia* etc., by the even entire margin of primaries.

The genus is based on *Phlogophora anodonta*, Guen., to which genus also Guenee referred his species *periculosa*, for which Mr. Grote resurrected *Trigonophora* Hb. so that the species thereby became *T. periculoso* Grt.: the genus *Conservula* being indicated by Mr. Grote, *Phlogophora anodonta* Guen., became transformed into *Conservula anodonta* Grt. The genus is probably very like *Trigonophora*.

Momophana, Grt. This genus is based on *Feralia Comstocki*, Grt. Buff. Bull. II, 59. Mr. Grote there indicates a new genus for this insect but does not describe it. In Stett. Ent. Zeit. Vol. 36, p. 195. he says of this genus: The insect so closely resembles *Moma fallax* that it can easily be mistaken for it. It differs generically by the pectinate antennæ and short palpi, in which it agrees with *Feralia*. From this it is separated by the shorter vestiture, the more prominent, broader head, and the larger (naked) eyes. The thorax has a posterior tuft. The form of wings agrees with that of *Moma*. The differences indicated between *Feralia Jocosa* Guen., and *Comstocki* in Buff. Bull. are the absence of ocelli the broader, more prominent head, the larger eyes, thinner and shorter vestiture, and the differences in ornamentation.

In *F. Jocosa* I have demonstrated the ocelli, the head often differs in size in specimens of the same species, and the difference in that respect between the sexes is often very decided: comparative thickness of vestiture where it is of the same nature is not a good generic character while ornamentation is at most of specific value. Add to this that Guenee considered the type form of *M. Comstocki* as only a variety of his *Jocosa*, and the probabilities are that *Momophana* is not a valid genus.

Rhododispa, Grt is unfortunately unknown to me in any way. Mr. Grote informs me it is described in Bull. Geol. Surv. of Terr. but I have been unable to find it, nor have the gentlemen in Washington who have kindly aided me been able to find it in his papers in that publication. Prof. Schwartz adds that he fails to find the name in Marshall's and Scudder's appendices to Agassiz's *Nomenclator Zoologicus*.

Aedia, Hb., was omitted from the Synopsis by accident, its synoptic formula is: Eyes naked; tibia not spinulated; anterior unarmed; palpi greatly exceeding the front; vestiture scaly; legs closely scaled: ♂ antennæ ciliate; wings comparatively short, fringes long. Thorax with a *Plusia* like posterior tuft; abdomen with dorsal tufts.

Agassizia, Behr. Trans. Ent. Soc. Phil. Vol. III, p. 23.

I give the original description:—

Genus maxime singulare inter *Boletobium* et *Xyliodes*, Gn intermedium, differt a *Boletobia* conformatione palporum qui cum palpis *Xyliodis* a cel *Gninee* descriptis omnino congruunt. A. *Xyliode* longe distat et forma alarum et venarum distributione qua cum *Boletobia* fere convenit sed tamen non congruit. Quum vero specimina perpauca quæ possideo squamis denudare non ausus venarum fabricam exacte describere nolui dum copia speciminum denudare et destruere permittat.

This gives little information and is scarcely sufficient to enable the genus to be recognized.

Audela, Wlk. Can. Nat. and Geol.

“Male. Body thick, very pilose. Proboscis short, feeble. Palpi short, slender, obliquely ascending, third joint elongate, conical, less than half the length of the second. Antennæ slightly pectinate; branches subclavate. Abdomen depressed, quadrate at tip, extending a little beyond the hind wings, Legs stout, very pilose; spurs rather short. Wings stout, moderately broad. Fore wings somewhat rounded at tip; costa straight; exterior broader hardly convex, rather oblique; interior angle not prominent.

Mr. Grote in Bull. Geol. Survey of Terr. Vol. —p. —refers *Panthea leucomela* Morr. to this genus and says it is a synonym of *Acronyctoides*, Wlk.

I believe I have now noticed in the synopsis and notes, all the genera recognized by Mr. Grote in his check-list of 1876 and all the subsequent genera, catalogued in Gerhard's list of 1878 and the Check-List of the Brooklyn Ent. Soc. of 1882. Many Noctuid genera other than those that are recognized in these lists have been described—a very large proportion of them by Mr. Grote—and have disappeared; some silently with scarce a record of the reason for their rejection being indicated in “Notes on some species of American Noctuidæ” and some after a fierce battle of authors. I have throughout my work and researches very generally accepted Mr. Grote's determinations and synonymic references, and have become convinced from my examination of the older works that his labors in the way of identifying species described in them were immense; I have

in this respect implicitly followed him; not only because where I have undertaken to verify him I have found him correct, but also because an erroneous certainty (!) is better than uncertainty and a conflict of opinion: many of the descriptions of authors apply equally well to or embrace three or four species and they could only have intended *one*: in such case it is much better that one species should be recognized as being intended than that doubt should hang over four.

But implicitly as I have followed Mr. Grote in some respects, I have felt myself at liberty to and have verified his generic references, and descriptions and have freely criticised his works. Mr. Grote's work has been mostly of a descriptive kind, and it has been as a rule exceedingly well done; but he has thus accustomed himself to search for *differences* and often overlooks *resemblances*: his theory as gathered from all his works seems to tend continually to the idea that color and ornamentation only, are specific distinctions, and that structural characters however minute, authorize genera. This idea has been pretty generally followed in his recent new descriptions, and thus, disagreeing with him in this respect, I have united many of his genera; only very occasionally I have separated genera united by him. *Anytus* for instance he has lately discarded, throwing *sculptus* into *Agrotis* and *capax* into *Xylina*!!! yet *Anytus sculptus* is certainly no *Agrotis*! The lashed eyes will serve to separate it at once from that genus. Mr. Grote's work now is and long must be the basis of our knowledge of the Noctuid fauna of America, and it is a pity that it is scattered in so many publications and that no index to it exists.

Guenee's generic descriptions are as a rule very superficial, and it is very possible that I have sometimes been in error in placing his genera as I have done, but that could scarcely be avoided at present. I expect and hope that the synopsis will be criticised and I intend thus to learn where I am in error and to enlarge my knowledge of this family: At all events this is only intended as a preliminary synopsis to render the study of the group more easy and to be completed and corrected at some future day.

In conclusion: I have not given any Bibliographical references whatever, nor have I given generic synonyms or except in a few instances where I differed from him, genera referred by Mr. Grote as sub-genera or sections of other genera because that would have burdened the work too much and would have too greatly exceeded the space allotted to me. I intend when giving synoptic tables of the species of the various genera, which I shall do as rapidly as I can accumulate material to give the Bibliography of each genus and species and my intention is in time to form a complete *Synopsis of the genera and species of N. A. Noctuidæ*.

Platycerus, Geoff.

(platys=broad, keras=horn.)

Thorax ♂ ♀ with side margins equally rounded: **quercus.**

Thorax of ♂ strongly, of ♀ very perceptibly angulate at middle.

Hind angles of thorax obtuse; mandibles of ♂ not denticulated.

oregonensis.

Hind angles of thorax distinctly rectangular.

Mandibles of ♀ small acute, slender, elytra finely striate and punctulate. **Agassii.**Mandibles of ♀ heavy, stout, very decidedly thickened at middle; of ♂ denticulate near tip, elytra more decidedly punctate and striate. **depressus.**

6. quercus, Wéb. Obs. Ent. p. 85. *securidens*, Say. Journ. Ac. Phila. III, 1823, p. 249. Brown red, shining, hind angles of thorax of ♂ rounded and of ♀ obtuse; elytra rugose, deeply punctured. N. Y., Pa., Car., D. C. 10 to 12 mm.

**Fig. 6**

In this and the other species of this genus the club of antennæ equals or exceeds in length joints 2 to 6 inclusive, the 2nd joint is always longer than the 3rd while in *Lucanus* the contrary is universally true—the American species of course being only considered. In the ♂ of this species the club is very heavy, joints 5 and 6 show a small acute inward prolongation and are pubescent, without being opaque, joint 7 has the prolongation nearly as long as 8 and 9 but much more slender, with 8 to 10 it is opaque pubescent. The ♀ ♀ in all the species of this genus differs from the ♂ ♂ in having only three joints of club pubescent opaque, the terminal is more rounded, the others are proportionately stouter and less prolonged while joint 6 is glabrous and has only a small acute inward prolongation as shown in fig. 9, ♀ of *depressus*.

7. oregonensis, Westw. Proc. Ent. Soc. 1844, p. 106, Trans. Ent. Soc. IV, 1847, p. 277, t. 20, f. 9. ♀, *coarulescens*, Lec. Proc. Ac. Phila. 1861, p. 345, ♀. Dark-bluish; head and thorax sparsely and roughly punctured, hind angles of thorax obtuse, lateral margin narrow; elytra punctured in rows, not rugose; no denticle between apex of mandibles and tooth of inferior margin. Or., Cal.—13 mm.

Fig. 7



The ♂ antenna is much as in the preceeding, but joint 6 is not so decidedly prolonged, is heavier and only pubescent on prolongation: the joints widen regularly from 3 to 6, and are glabrous. (fig. 7.)

8. Agassii, Lec. Proc. Ac. Phila. 1861, p. 345. ♀.

Black; mandibles of ♀ small acute without tooth, thorax densely punctured, broader than that of *oregonensis*, with distinct smooth dorsal line; elytra obsoletely striate, striæ punctured, interstices rugose with confused small punctures. Cal. 10 mm.



Fig. 8

Of this species I unfortunately have not seen the male, it appears to be very rare, and despite my endeavors I have not been able to obtain one. The antennæ of the ♀ agree with the others of the genus; the terminal joint is rather more rounded, and there is a distinct transverse impression at the middle as shown in figure 8.

9. depressus, Lec., [*piceus* || Kirby, Fauna. Bor. Am. IV, 141.] Lec.

Agass. Lake Sup. 1850. p. 224. Black, the mandibles of the ♂ are much dilated at apex, but less curved than in *quercus*; the hind angles of thorax are said by Leconte in his original description of the species to be obtuse very little rounded, but specimens determined by him as *depressus* have the hind angles as stated in the synopsis. Lake Superior, Dakota, Colorado, H.B.—13 mm.



Fig. 9

Male and Female antennæ are given side by side in figure 9, and this explains better than I can do the difference between them. In the male joints 7 to 10 are prolonged, pubescent; prolongations slender elongate: joints 5 to 6 somewhat prolonged inwardly. In the ♀ joints 8 to 10 only are prolonged, pubescent and opaque, prolongations heavy and stout, 7 glabrous and acutely prolonged.

CERUCHUS, *Mc Leay*.

(Keruchos=hornbearer.)

Elytra punctate not striate at the sides. **punctatus**.
Elytra striate.

Striæ deep, strongly and coarsely punctured. **striatus**.

Striæ shallow, more sparsely and less deeply punctured. **piceus**.

10. punctatus, Lec. Ann. and Mag. Nat. Hist. London 1869. p. 377. Differs from *striatus* by the much larger and broader triangular excavation of the front; the thorax much more strongly punctured and especially by the elytral striæ very fine, the outer ones obsolete, and the intervals perfectly flat and coarsely punctured. Col., Wash. Terr.—13 mm.

11. striatus, Lec. Proc. Ac. Phila. 1859, p. 85. ♀. Head and thorax with large, but sparse punctures; elytral striæ deep, at middle more densely, at the sides less broadly punctured; the thorax is more convex and the elytra more deeply striate and much more punctured than in *piceus*.

Wash. Terr., Or., Cal. (Shoalwater Bay.)—16–17 mm.

12. piceus, Weber, Obs. Entom. p. 84, *Balbi* Casteln. Hist. Nat. II, 174. t. 17, f. 3–4. This is the most common species of the present genus and always found in great numbers. N. Y., Pa., Ohio, D.C.,—10–15 mm.

The pupæ of this species were found by Prof. Schaupp in large numbers in an old beech-stump, in fact so plentiful were they that he fed his *carabidous* larvæ with them—they are $\frac{1}{2}$ inch in length, perfectly white, stout, with free wings and closely appressed legs, abdominal segments strongly marked and the head folded downward upon the *sternum*. The sexes are readily distinguished by the relative size of the mandibles, the form of which can be perfectly distinguished through the transparent membrane enveloping them.



In the three species of this genus the antennæ seem to be alike: they differ from all the preceeding in being straight instead of geniculate though the first joint is still nearly $\frac{1}{2}$ as long as the entire antennæ: like the foregoing they are 10 jointed, not counting the small base-like joint which fitted into the socket in the head gives a range of motion in every direction, but unlike them none of the

12. joints are opaque or pubescent. There are never more than 3 joints prolonged, and the prolongations are never slender; all three of them have the tip more or less excavated, and they are somewhat securiform, the figure (12) shows the form peculiar to this genus.

SINODENDRON, *Hellwig*.

(sino=to hurt, dendron=tree.)

13. rugosum, Mann. Bull. Mosc. 1843, II, 262; *americanum*, Beauv. Ins. Afr. et Am. p. 192, t. 1, D. f. 1–2 Black, thorax rugose, variolose,

truncate in front, unidentate, head scarcely pilose with a recurved horn in ♂ and ♀; elytra rugose intricate. Cal., Wash. Terr., Or.—11–18 mm.



The antennæ of this species do not differ remarkably from those of the foregoing genus. The slight difference in proportion is shown in figure 13 and the puncture on joints 8 to 10 are all that separate it.

PASSALUS.

(passalus=a post.)

13. 14 *cornutus*, Fabr. Syst. El. II, 256, Beauv. Ins. Afr. et Am. I, 1, t. 1, f. 1. *disjunctus*, Illig. edit. Oliv. I, 78. *distinctus*, Web. Obs. Entom. I, 79; Percheron, Mon. p. 99. t. 7, f. 6. *interruptus* ♀, Lin. Mus. Lud. Ulr. p. 35; Olivr. Ent. I, p. 25, t. 3, f. 5. To well known as to need any description and well represented on the plate.

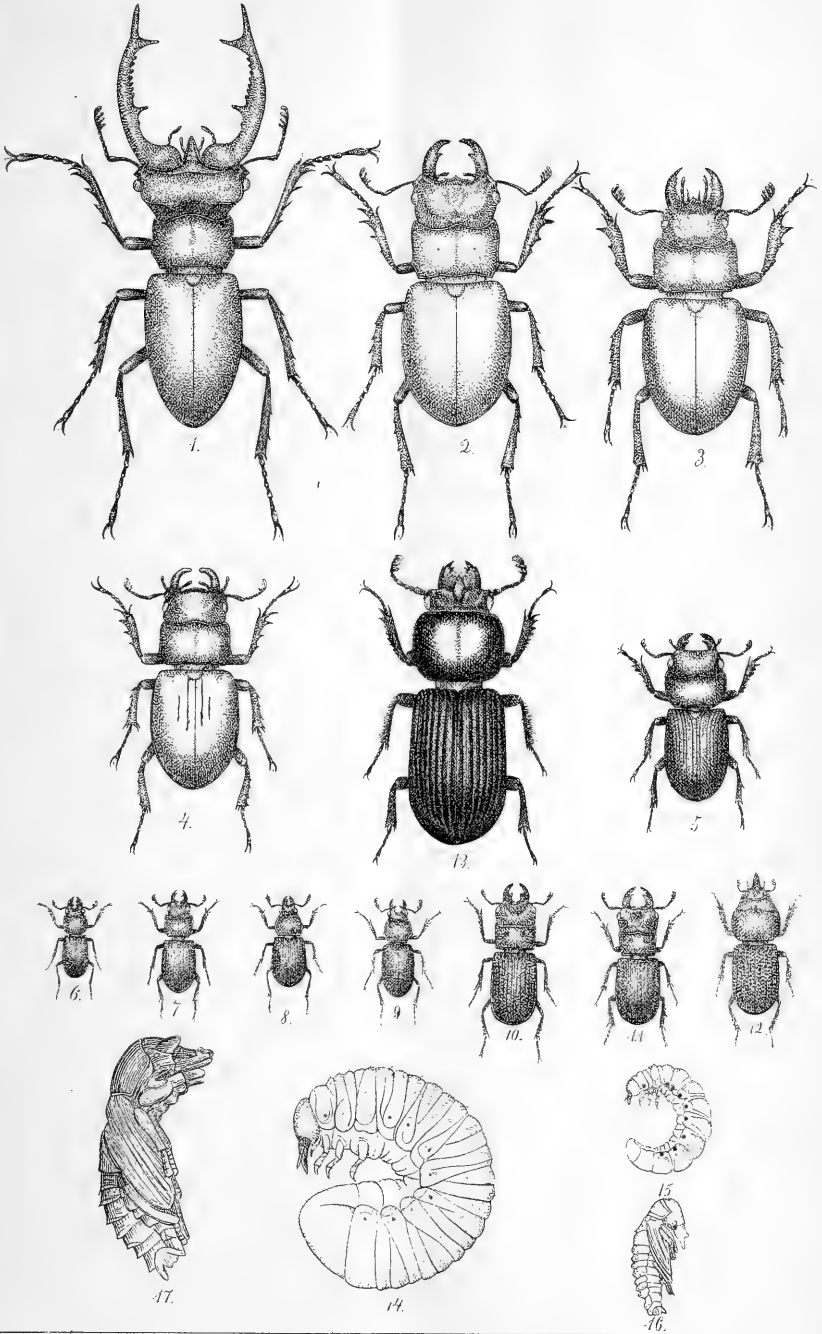


The larva is remarkable for having the four anterior legs normal, but the posterior aborted, has been described by Burmeister Handb. V, 451, Chapuis. and Candeze Mem. Liege. VIII, 467 t. 4, f. 5, and also by Schioedte Nat. Tidsskrift, Vol. IX, p. 356. pl. XVIII, figs. 12–19 and pl. XIX, fig. 17. N.Y. to Florida, Texas; 32 to 38 mm.

The antennæ of this species are unique, separated from all others of 14 this group by the deeply emarginate mentum and peculiar form, the antennæ place it between *Dorcus* and *Ceruchus*. Having them straight as in the latter genus, the club is formed like that of the former, from both it differs by the dense clothing of hair on each joint, and by the small, perfectly cylindrical 2nd joint; the fig. 14 precludes the necessity of further description.

Explanation to Plate.

- | | | |
|------------------------------------|--------------------------------------|-----------------------------------|
| 1. <i>Lucanus elaphus</i> , F. | 6. <i>Platycerus quercus</i> , | 11. <i>Ceruchus piceus</i> , Web. |
| 2. " <i>dama</i> , F. | 7. " <i>oregonensis</i> , Wstw. | 12. <i>Sinod. rugosum</i> , Man. |
| 3. " <i>mazama</i> , Lec. | 8. " <i>Agassii</i> , Lec. | 13. <i>Passalus cornutus</i> , F. |
| 4. " <i>placidus</i> , Say. | 9. " <i>depressus</i> , Lec. | 14. Larva of 2. |
| 5. <i>Dorcus parallelus</i> , Say. | 10. <i>Ceruchus punctatus</i> , Lec. | 15, 16 Larva & pupa of 11. |
| | 17. pupa of 13. | |





MELITÆA, Fabr.

24. M. Fulvia, W. H. Edw. *Male*: Upper side brown-black at base, dusted with fulvous or partly replaced by fulvous; costal margin and apex of primaries black, and both hind margins edged black; rest fulvous; both have a sub-marginal series of fulvous spots preceded by a black line, and beyond a common series of yellow spots; next a series across disk larger, and on secondaries elongated, and more or less confluent with the spots of the outer row; on primaries a large yellow spot edged fulvous inside arc of cell and two or three spots below cell; in cell of secondaries a similar spot; fringes alternately and equally black and white. Underside of primaries pale orange fulvous, the light spots repeated; secondaries wholly yellow-buff, nervules broadly edged black, and all the margins edged black; across the extra discal area a black band, inside with six or seven small yellow spots. Expanse 1.5 inch.

Female same size; the fulvous shade predominates, only apex and costal margin of primaries and both hind margins being black; the yellow markings indistinct.

Under side as in male. Western Texas and Southern Colorado.

25. M. Ulrica, W. H. Edw., (M. Imitata, Strecker.) *Male*: Upper side black marked and spotted with deep red-fulvous, much as in *Phycodes Vesta*; both wings have a submarginal series of small crescents, succeeded on primaries by a sinuous row of small spots, and next a bent row of larger ones; a fourth row curves round end of cell; some spots on and below cell. Secondaries have two rows of irregular small spots across extra discal area and a broad band on disk. Under side of primaries black over the outer fourth; next margin a narrow band of confluent spots, and beyond a row of small white spots; next the second row of upper side is repeated, making third row here; beyond to base mostly fulvous, the spots of upper side imperfectly repeated; secondaries have a marginal band and a row of crenated white spots; beyond these the ground is black and in this is a row of small rounded fulvous spots; across the disk a row of white points and a white band; beyond to base fulvous on black ground, but with a white spot in cell and a band near base, another at base.

Female similar to male, the fulvous paler. Expanse of male .85 in., of female .9 inch. San Antonio, Texas.

26. M. Dymas; W. H. Edw., (M. Larunda, Strecker.) *Male*: Upper side brownish-black, marked and spotted with orange fulvous; primaries have a submarginal row of rounded spots, obsolete on apical

area; both wings crossed beyond disk by a common band of separated spots; primaries have five spots in cell, separated by black lines, and several spots at end of area below cell; secondaries have the basal area nearly all fulvous, leaving a broad black belt between this and the extra discal band; in the cell a subovate black spot with fulvous stripe in middle. Under side of primaries has margin bordered by a band of confluent crenate spots, and before this is row of small fulvous spots which have black central points. Expanse .95 inch.

Female similar to one of the forms of "*M. Palla*," color dull brown, the two outer rows of spots on hind wings and all of those on fore wings dull yellow, more or less suffused with red; the discal row on hind wings yellow-buff. Beneath, fore wings have a yellowish discal band and spots in cell; spots silvered as in male. San Antonio, Texas.

27 *M. Perse*, W.H. Edw. Shape of *M. Dymas*. Upper side yellow fulvous with black lines; both margins broadly bordered black, on which are submarginal fulvous spots, small and irregular in shape on primaries, sub-crescent on secondaries; anterior to these a common series of sub-quadrate spots, and another similar, elongated, the two separated by a black line on primaries and partially on secondaries; thence to bases of wings fulvous with black reticulations; fringes black, white at tips of the nervules. Under side of primaries fulvous, the black markings repeated indistinctly; costal edge white, along hind margin a narrow buff belt, and next a series of yellow-white crescent spots. Secondaries have a similar edging to margin, and a series of spots, sometimes small and rounded, orange, on a whitish ground, sometimes wholly orange; above these a narrow buff belt, a black line and a white band, bisected with black next costal margin; thence to base orange, with a white spot edged black in cell, a cross band of four white spots, an orange band, a white band on shoulder, the tip of the shoulder buff.

Body above fuscous, the abdomen on sides fulvous, beneath both abdomen and thorax yellow white; legs fulvous, the femora white on under side; palpi fulvous, white at base; antennæ black, annulated white; club black, ferruginous at tip, white beneath.

Female similar to male, the fulvous more diffused. Under side as in male. Expanse of male 1.1 inch, of female 1.3 inch. Arizona.

The following genus very closely resembles *Melitæa* and differs from it so far as we can see only in the less produced apex of primaries and the somewhat more even costal and internal margin of the same wing; the costa having also a very distinct shoulder near the base of the wing,

MYAS, Ziegler.

Synoptic table by J. L. Leconte, M. D.

Stout shining insects with head and thorax black, and elytra purple.

Thorax depressed at sides, basal impressions broad, moderately deep, elytral striæ punctured. **coracinus**, Say.

Thorax not depressed at sides, basal impressions deeper, elytral striæ impunctured, a smaller species. **cyanescens**, Dej.

M. coracinus, Say, Trans. Am. Philos. Soc. II, 59, and IV, 26; M. St.—18–20 mm.

M. cyanescens, Dej. Spec. III, 524. = *foveatus*, Lec. Ann. Lyc. IV, 355. M. St., Can., Lake Superior.—13–15 mm.

OLISTHOPUS, Dej.

Synoptic table by Geo. H. Horn, M. D.

Piceous, elytra fuscous, thoracic and elytral margin and legs testaceous.

Elytra scarcely iridescent, base feebly emarginate; ocellate punctures at base of scutellar striæ feeble. **parvatus**.

Elytra iridescent, rather deeply emarginate at base; ocellate punctures well marked.

micans.

O. parvatus, Say, Trans. Am. Philos. Soc. II, 49. Dej. Spec. III, 181. = *cinctus*, Say, Trans. Am. Philos. Soc. IV, 424. Lec. Proc. Ac. Phila. 1854. p. 58. N. Y., Pa., Ohio, Ind., Ga.—7.2 mm.

O. micans, Lec. Ann. Lyc. IV, 230. Ga., La.—4 mm.

PERICONA, Cast.

P. nigriceps, Dej. Testaceous, shining; head black, elytra faintly striate, 3rd interstice with three impressed punctures, the 8th stria entire, suture and apex sub-infusate, legs, palpi and antennæ pale.

P. nigriceps, (Bembidium) Dej. Spec. V, 44. = *pallipennis*, (Trechicus) Lec. Trans. Am. Philos. X, 386. = *umbripennis*, Lec. l. c. Carolina.—2–3 mm.

LACHNOPHORUS, Sturm.

L. elegantulus, Mann. Dark bronze; surface pubescent; thorax ovate, head and thorax green bronze, elytra white, smoky at base and with a brown undulating fascia, elytral striæ very deeply punctured near base, with three dorsal punctures, the eighth striæ distant from margin with distinct ocellate punctures.

L. elegantulus, Mann. Bull. Mosc. 1843. II, 215., Lec. Journ. Ac. Phila. IV, t. 4, f. 1. mediosignatus Menet, Bull. Ac. Petr. II, 1844, p. 62. Tex. Cal.—6 mm.

EUPHORTICUS, n.g. Horn.

Erected on *Lachnophorus pubescens*, Dej. For the generic character of this as well of all the other genera of Carabidæ we refer the reader to Dr. Horn's "On the genera of the Carabidæ" Trans. Am. Entom. Soc. IX, p. 91 to 196. with 8 plates.

L. pubescens, Dej. Entirely black, shining; surface glabrous, pubescent only at margin. Elytral striæ deeply punctured near base, without dorsal punctures.

L. pubescens, Dej. Spec. V, 30. Fla.—5 mm.

Bull. Brooklyn Ent. Soc. 1882.

ATRANUS, Lec.

A. pubescens, Dej. Long slender, piceous above and beneath with abdomen, legs, antennæ and mouth-parts red-brown, antennæ with but three joints glabrous, elytra pubescent, margined at base, surface striate, ocellate punctures well marked, dorsal punctures not distinct. It resembles very much a slender *Platynus* (*pusillus*).

A. pubescens, Dej. Spec. III, 122. Lec. Ann. Lyc. IV, 439. = *obconicus*, Hald., Proc. Ac. Phila. I, 229, N. Y., Pa., D.C.—7-8 mm.

PENTACONICA, Schmidt Goebel,

(Horn, Trans. Am. Ent. X, 158.)

P. (Rhombodera) flavipes, Lec. A small species with a general resemblance to some of the varieties of *Lebia analis*. The thorax is short, the sides strongly angulate, the base narrowed. The elytra are very vaguely striate, without punctures, surface is finely alutaceous. Legs testaceous, underside of abdomen piceous.

The species vary greatly in color.

var. *flavipes*, Lec. Entirely piceous.

var. *bicolor*, Lec. Head and thorax above and beneath pale reddish yellow.

var. ———, Head and elytra piceous, thorax reddish yellow.

Gulf States, Arizona, Ills. and Ks.—3.5-4.5 mm.

P. flavipes, Lec. (Didetus) Trans. Am. Philos. Soc. 1853, p. 377. = *bicolor*, Lec., New Spec. Col. I, 7. = *pallipes*, Lec. Class. Col. p. 377, La. Gulf Sts., Ills. Ks. Ariz, 3.5-4.5 mm.

P. angulata, Boh. (*Lebia*) Eugen. Resa. p. 7, South America.?

COPTODERA, Dej.

(Horn. Trans. Am. Ent. Soc. X, 131.)

C. aerata, Dej. Piceous, elytra bluish green. Male.—Anterior tarsi feebly dilated, first three joints biserially squammulose. Middle tibiæ distinctly emarginate on the inner side near the tip, the tarsi slender. Anal segment bisetose each side.

Female.—Tarsi slender, Middle tibia not emarginate, Anal segment as in the male.

C. aerata, Dej. Spec. I, 277, Chaud. Ann. Belg. 1869, p. 179. = *viridipennis*, Gory. Ann. France, 1833, p. 194. = *viridipennis*, Lec. Ann. Lyc. IV, 196. = *ruficornis*, Chaud. l. c. p. 179. M.W. & S. St.—6-6.5 mm.

PHLOEOXENA, Chaud.

(Horn. Trans. Am. Entom. Soc. X, 131.)

P. signata, Dej. Head piceous. Thorax testaceous with a median piceous spot more or less defined. Elytra piceous with an undulating fascia posteriorly, and an irregular dentate band more or less interrupted, broad at the lateral margin, behind the base, testaceous. Male anterior tarsi with three joints slightly dilated and beneath biserially squammulose. Anal segment with one seta on each side.*

Female.—Tarsi slender. Anal segment bi-setose each side.

P. signata, Dej. (Coptodera) Spec. I, 275. = *collaris*, Lec. Ann. Lyc. IV, 197, Gulf St. Carolinas, Ga.—5.5-6 mm.

Description of New Moths.

By FRED. TEPPER.

Attacus Cinctus, nov. sp. see Plate, figs. 1 & 2.

Male. Expanse $4\frac{1}{8}$ inches.

Head and thorax brownish-red; collar white; a white band between thorax and abdomen; abdomen above pinkish-red, very finely dusted with white, with a broad lateral band of white on each side, dotted with red in the middle of each segment; beneath red, rather indistinctly banded and streaked with white; anal tuft red, yellowish beneath; legs light brown; antennæ pectinated and fawn colored.

Primaries rather produced at apex; ground color brownish-red with black shadings; an angular white basal band bordered inwardly red and outwardly by black; the costa is heavily sprinkled with white and black; the median field encloses a large irregular triangular semi-transparent spot, edged first with white, then with black, and is outwardly bounded by a transverse wavy narrow black band, extending from costa to the interior margin, then by a white band, followed by a narrow one of vermilion; beyond this the color is brownish-red, heavily powdered with white and black on the inner side; the apical area reaching on the costa to the red band is light violet with a scalloped white line curving obliquely downward from apex; the apical eye is composed of two black spots, the outer one kidney-shaped, the inner one triangulate; the color between the white line and the inner black spot is bright ochraceous; the border is olive gray, intersected by a wavy black line; which is bordered outwardly by a silvery white band, diminishing toward the inner angle.

Secondaries same color as primaries; basal band white shaded red inwardly and black outwardly; the median bands are the same as on primaries; the semi-transparent spot is larger and of an irregular diamond shape; the border encloses interiorly irregular spots of red, which grow smaller and darker towards the anal angle, where there is one pretty large black spot.

The underside of both wings is much the same as above, only that the colors are less vivid, and that the basal bands are barely visible; the costa on secondaries from base to the median band is white, faintly bordered by black below. One male only examined.

Female; Expanse $4\frac{1}{2}$ to 5 inches.

Eight specimens served as types, and it is necessary to say that they vary very considerably in the ground color, some being dark brick-red, others dark brown, and others again rich olive-brown, all shaded with

black; the principal markings are substantially the same as in the male, excepting that the transverse black band is in most cases much more deeply indented, although, in one of the females before me the band has a more even outline than in the male, and that the semi-transparent spot on secondaries varies in shape, being rounder and less regular in some; the outer apical black spot in some is disconnected at the middle, thus forming two irregular triangles; the borders are generally heavier, especially on secondaries, where the spots interiorly are larger and better defined, and dotted with black, particularly towards the anal angle.

I suspected at first that this species would prove to be *Attacus splendidus*, De Beauv, but the description and figure (Ins. Afr. et Amer.) in several respects do not tally with the insect here described.

The accompanying plate, figuring both male and female, will furnish the exact outlines and markings of this exquisite species.

The cocoons are of close texture, with but one covering, oval in shape, and are firmly attached to the twig or branch, somewhat in the manner of "*Cynthia*;" the color is dirty silvery white streaked with light or dark brown, and the chrysalis is covered with a whitish powder, like in the *Catocalæ*.

Cocoons of this moth were found in Southern Arizona by Mr. Robert Driver.

Platysamia Polyommata, nov. sp. see Plate, figure 3.

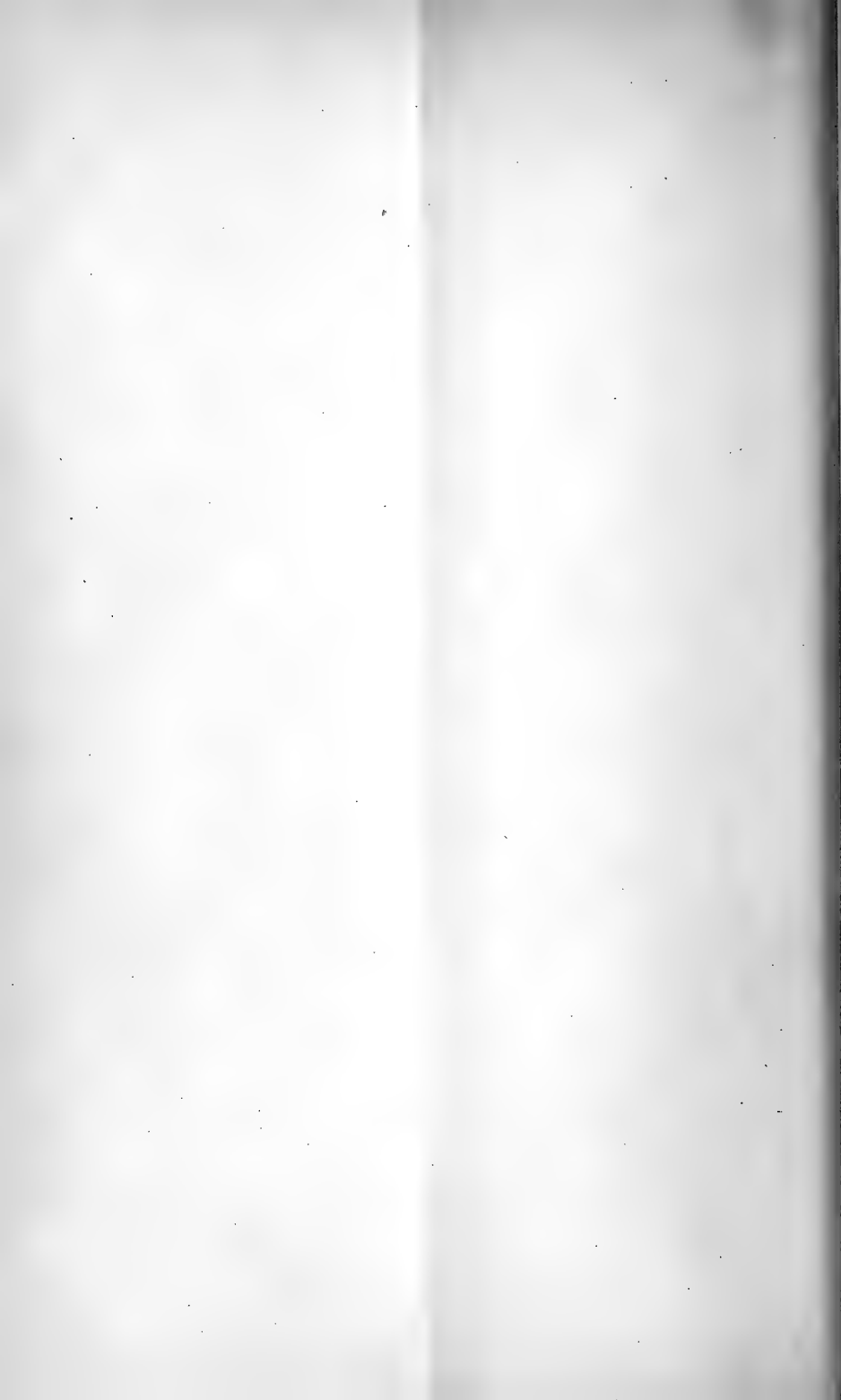
Female; Expanse five inches.

The shape is like that of "*Cecropia*".

Head and thorax dull black, collar pinkish-white, a tuft of red hairs at base of thorax; abdomen dull black with a double row of lateral red stripes, enclosing small black spots; legs dull black; antennæ small, pectinated and brownish black.

Wings dull black with the costa on primaries slightly inclining to gray; no basal bands, nor light abdominal margin to secondaries; the spots in the median fields are small and plain white with no edging, on primaries they form a small triangle, and on secondaries simply a bar. A wide band of white near the outer margin runs through both wings and makes a decided curve towards the apex on primaries, where it is tinged with pale fulvous; beyond this band outwardly, the color on primaries is grayish-black, lighter towards outer margin; the apical spot is black, surrounded by dark gray, then bordered inwardly by a bluish crescent edged black, and outwardly by a dull reddish shading; between each of the veins below the apical spot, and bordering closely on the white band, is a blu-





ish crescent corresponding with the apical one, filled in with gray and bordered outwardly by a sharpe triangle of black; there are five of these extra spots, which diminish in size and clearness as they approach the inner margin; the dark gray ground is outwardly scalloped with a narrow black line, somewhat like in "*Cecropia*"; the borders to primaries are gray shaded whitish inwardly, especially towards apical area; at apex a zig-zag white line connects with the first blue crescent, and between this line and outer margin is a dull red spot.

Beyond the white band on secondaries the color is blackish, with dark gray borders and a scalloped black line, enclosing inwardly a row of black spots, two between each vein.

The underside is a reproduction of the upperside, with the colors more subdued; no light costal band to secondaries.

This remarkable insect was likewise found in Southern Arizona by Mr. Robert Driver. Though apparently allied to "*Cecropia*," it differs so materially from this and all the other forms of this group, that I did not hesitate to describe it as new.

New Noctuids and Notes.

By JOHN B. SMITH.

Calymnia æquilinea, sp. nov. Expands $1\frac{1}{2}$ inches.

Color pale luteous, secondaries slightly paler: primaries with two narrow, parallel paler lines, one just inside basal, and the other just outside of outer third; reniform and orbicular large, distinctly outlined by a very narrow white line, and slightly darker than the remainder of the primaries; secondaries immaculate; beneath paler, entirely immaculate. 1 specimen, Colorado, my collection.

This species has the generic characters well marked; it has a small but distinct elevated crest just behind collar, but is otherwise without tuftings, slightly darker in color than the other species I have seen, it still as the same general *facies*. It differs from both of the American species heretofore described in having the pale lines very nearly parallel instead of converging inferiorly; in other respects it is closely allied to them.

Hadena juncimacula, sp. nov. Expands $1\frac{3}{4}$ inches.

The usual generic characters: a distinct anterior and posterior divided crest: body and abdomen of a bright gray; a distinct narrow black line

near the crest of collar from costal base of primaries; crest of collar narrowly white. Primaries carneous gray, slightly paler at the inferior half; through the centre of the wing is a reddish or bright brownish tint more decided at outer third; the basal half line is white and is strongly and acutely angulated outwardly on the median vein; the t. a. line is indistinct, pale and very strongly dendate, margined outwardly at the inferior half of its course by a narrow black line; the t. p. line is pale indistinct, and scarcely discernable at the inferior half of its course, slightly angulated outwardly on the venules; the outer margin of the wing is gray bordered interiorly by a narrow black shade, which is in turn bordered by a more diffuse brown line; inside of this is a broader distinct paler gray shade extending from apex to hind margin. Reniform and orbicular large, and confluent: they are enclosed by a narrow white line parallel with the median vein beneath, enclosing the orbicular to the upper margin, crossing to the reniform which it touches at the middle, and curving round that to the point or place of beginning; the orbicular proper is whitish, a black spot in the white space between the two spots; reniform carneous with a darker spot a lower part. The outer margin is slightly dusky outer margin. Beneath, primaries darker as gray with a narrow pale outer margin, secondaries pale whitish.

The ♂ antennæ are robust with short pectinations; pectinations ciliate.
1 specimen, Utah Territory, my collection.

My type of this species was received from Ft. Thornburgh, and is in perfect condition; the peculiar junction of reniform and orbicular readily distinguishes it from all its allies known to me, and it does not agree with the description of the few species that I have not seen. It is one of the largest species of this genus, and belongs near the *Arctica* section.

Mamestra promulsa, Morr.

This species is referred by Mr. Grote to *Anarta*, and is so catalogued in his "New List". Through the kindness of Mr. Tepper I have been enabled to examine the type; and it certainly is no *Anarta*; the eyes are round, not reniform as in *Anarta*, and the entire habitus is different from that of the latter genus; the type is a ♀ and has the ovipositor extruded; it is therefore referable to the section *Dianthoeicia*; the specimen has the legs defective, and is otherwise poor so that it is not safe to change the generic determination of Mr. Morrison without fresh material on hand. An *Anarta* it is not for reasons stated above.

Record of the Coleopterology of the United States in the year 1882.

Geo. Horn, M. D.

Trans. Am. Ent. Soc. X, pp. 101-164.

Revision of the species of some genera of Buprestidae pp. 101-112, with plate.

Notes on some little known genera and species of Coleoptera pp. 113-126 with 2 plates.

Synopsis of the Species of the tribe Lebiini, pp. 126-164.

H. F. Jayne, M. D.

Proc. Am. Phil. Soc. XX, June 1882. pp. 343-377.

Revision of the Dermestidae of the U. S. pp. 343-377, with 4 pl.

John B. Smith,

Trans. Am. Ent. Soc. X, pp. 73-100.

A synopsis of the Mordellidae of the U. S., pp. 73-100, with 3 pl.

L. W. Schaufuss, P. D.,

Ann. Soc. France, 6th ser. Vol. II, 1882. p. 43.

De quibusdam coleopteris novis, p. 43.

H. S. Gorham,

Biologia Centrali Americana 1882.

Cleridae.

E. Candeze,

Mem. Liege, 2nd ser. t. IX, Febr. 1882.

Elaterides nouveaux, 3d fasc. pp. 59-97.

David Sharp, M. B.

Scient. Trans. Royal Dublin Soc. vol. II, ser. II, Dubl. 1880-82.

On aquatic carnivorous coleoptera or Dytiscidae. pp. 179-1003 pl. VII-XVIII.

CARABIDAE.

Geo. H. Horn, M. D.

Trans. Am. Ent. Soc. X.

Callida platynoides n. sp. Cal, p. 139. *Philopuga castanea* n. sp. Cal p. 144. *Plo. lionus dorsalis*, n. sp. Fla. p. 146. *Pinacodera semisulcata*, n. sp. Cal. p. 148 and *P. sulcipennis*, n. sp. Cal. p. 148.

After *Pentagonica* add *Onota floridana* Horn.

Drop *Lebia frigida* (= *fuscata* Dej.)

Drop *Apristus latens* Lec (= *subsulcatus*, Dej.)

Drop *Blechnus linearis* Lec (= *nigrinus* Mann.)

Drop *Metabletus borealis* Zimm (= *americanus* Dej.)

Drop *Axinopalpus californicus* Mots (= *biplagiatus* Dej.)

Drop *Tecnophilus chloridipennis* Mots. *nigricollis* Lec. and *Pilatei* Chd. (all = *croceicollis* Men.)

For *Onota trivittata* Lec read *Euproctus Solier trivittatus* Lec.

Add. to *Philophuga*: *Ph. æmæna* Lec and drop *Ph. Hornii* Chd. (= *æmæna* Lec)

Drop *Callida cyanoptera* Lec = (*decora* Fab) *Pinacodera fuscata* Dej. is a var. of *limbata* Say.

Drop *Cymindis brevipennis* Zimm. (= *planipennis* Lec.) *abstrusa* Lec (= *cribricollis* Dej.) *venator* Dej. (= *americana* Dej.)

Drop *Apenes angustata* Sz. (= *lucidula* Dej.)

Change *Rhombodera* Reiche to *Pentagonica* Schm. Gœb. and *ipes* Lec to *flavipes* Lec with the syn. *pallipes* Lec and *bicolor* Lec.

P. angulata (*Rhombodera*) Boh. is probably South American.

DYTISCIDAE.

David Sharp, M. B.

Trans. R. Dubl. Soc. vol. II, ser. II. Dublin 1880—82.

Canthridus punctipennis n. sp. Car. p. 270, *Laccophilus fuscus* n. sp. Nev. p. 290, *L. insignis* n. sp. Tex. p. 290, *L. terminalis* n. sp. Tex. p. 292, *Hydrovatus brevis* n. sp. Cal. p. 324, *H. compressus* n. sp. La. p. 324, *Bilessus pictodes* n. sp. p. 348, *B. obesus* n. sp. Tex. p. 349, *B. discretus* n. sp. Tex. p. 350, *B. texanus* Tex. p. 366, *Cœlambus fumatus* n. sp. U. S. p. 400, *C. infuscatus* n. sp. Nev. p. 402, *Deronectes suffusus* n. sp. p. 434, *D. posternalis* n. sp. p. 434, *Hydroporus diversicornis* n. sp. Tex. p. 437, *H. integer* n. sp. Pa. p. 438, *H. cimicoides* n. sp. N. A. p. 439, *H. lobatus* n. sp. N. A. p. 439, *H. scrutator* n. sp. N. A. p. 440, *H. lynceus* n. sp. N. A. p. 440, *H. peltatus* n. sp. Can., *H. clypealis* n. sp. Mass. p. 441, *H. anticus* n. sp. Pa. La. p. 441, *H. eruditus* n. sp. Pa., *H. republicanus* n. sp. Pa., *H. solitarius* n. sp. Mass. p. 445, *H. occidentalis* n. sp. Br. Col. p. 456, *H. despectus* n. sp. Can. p. 466, *H. perplexus* n. sp. Cal. p. 467, *H. rusticus* n. sp. Nev., *H. inornatus* n. sp. Mass. p. 478, *H. latifrons* n. sp. N. A. p. 478, *H. rufilabris* n. sp. Tex. p. 479, *H. terminalis* Cal. p. 484, *H. Hardyi* n. sp. Cal. p. 485, *H. Belfragei* n. sp. Tex., *Hydrotrupes palpalis* n. sp. Cal. p. 492, *Agabus perplexus* n. sp. Vanc. Cal. p. 498, *A. planatus* n. sp. N. A. p. 503, (? ♀ var of *semivittatus* Lec.) *A. texanus* n. sp. Tex. p. 505, *A. stridulator* n. sp. H. B. Can. p. 509, *A. mutus* n. sp. H. B. p. 513, *A. subfuscatus* n. sp. Mass. p. 514, *Ilybius inversus* n. sp. N. A. p. 552, *I. discedens* n. sp. H. B. p. 557, *Coptotomus obscurus* n. sp. Tex. Fla. p. 601, *Rhantus longipes* n. sp. Alaska, Br. Col. p. 613, *R. obscurus* n. sp. Cal., *R. plebejus* n. sp. Hermit Lake, *R. discedens* n. sp. Cal. p. 615, *R. sericans* n. sp. Brit. Col. p. 619, *Colymbites Crotchii* n. sp. Cal. p. 626, *C. rugipennis* n. sp. Nebr. p. 628, *Dytiscus vexatus* n. sp. N. W. of N. A. p. 643, *Hydaticus modestus* n. sp. N. A. p. 650, *H. americanus* n. sp. Red River p. 651, *Graphoderes perplexus* n. sp. U. S. p. 695.

LEPTINIDÆ.

Geo. H. Horn, M. D.

l. c. p. 113.

Leptinillus n. g. for *Leptinus validus* Horn.

SILPHIDAE.

L. W. Schaufuss, Ph. D.

Ann. Fr. vol. II, 1882, p. 43.

Triarthron cedonulli (sic!!) n. sp. Cal. p. 43.

LATHRIDIIDAE.

Geo. H. Horn.

Trans. Am. Ent. Soc. X. p. 116—17.

Monædus n. g. *guttatus* n. sp. both described by Leconte; *Dasyce-
rus* Brogn* *carolinensis* n. sp. N. Car. p. 117 and *D. angulicollis* n. sp.
Cal. p. 117 both by Horn.

DERMESTIDAE.

Horace J. Jayne, M. D.

Proc. Am. Philos. Soc. 1882, XX. p. 343—377.

Attagenus Hornii n. sp. Cal. p. 356, (= *biturodes* ♀ Crotch Check-
list), *A. perplexus* n. sp. Nev. p. 356, *A. varicolor* n. sp. Pac. St. p. 357,
Acolpus n. g. p. 360, (after *Perimegatoma*) *A. primus* n. sp. Tex. p. 361,
Trogoderma simplex n. sp. W. St. p. 362, *T. sternale* n. sp. N. Mex. Ariz.
Cal. Tex. p. 363, *Axinocerus* n. g. p. 367, (after *Cryptorhopalum*) *A.
americanus* n. sp. Tex. p. 368.

To *Dermestes* add *elongatus* Lec, *vulpinus* Fab. — Drop *nubilus* Say and *rattus*
Lec. (= *murinus* Lin); *persimilis* Cr. (not desc.); *bicolor* Fab and *maculatus* Deg.
(= *vulpinus* Fab.); *signatus* Lec (= *lardarius* Lin).

To *Attagenus* add *piceus* Oliv and drop as its synonyms *megatoma* Fab, = *dich-
rous*, Lec = *spureus* Lec = *rufipennis* Lec.

In *Trogoderma* drop *pallipes* Ziegl and *inclusum* Lec (both = *tarsalis* Mels)**
and *pusillum* Lec (= *ornatum* Say.)

In *Anthrenus* drop *flavipes* Lec, *thoracicus* Mels and *lepidus* Lec. (= *scrophu-
larice* Lin,)

SCARABIDAE.

Geo. H. Horn.

l. c. X. p. 118—1

*Oniticeilus** Serv. *californicus* n. sp. Cal. p. 118, (near *Ontho-
phagus*) *Plusiotis Lecontei* n. sp. Ariz. p. 120.

Dr. Horn also unites *Lichnanthe* and *Dasydera* under the generic name *Amphi-
coma** Latr. (with syn. tabl.)

* Genus new to our fauna.

** Mr. Jayne gives *inclusum* Lec. (June 1854) as the name to stay, but *tarsalis* Mels (Oct. 1844) and *pallipes* Ziegl (Aug. 1845) are far older and *tarsalis* will stand.

BUPRESTIDÆ.

Geo. H. Horn, M. D. l. c.

Melanophila intrusa, n. sp. Cal. Nev. p. 105, *M. obtusa* n. sp. Ga p. 106.

To *Anthaxia* add *salicis* Fa (Europ. spec. found in Kans.) and drop *inornata* Rand (= *aeneogaster* L. & G.) and *bivittata* Gory (= *quer-cata* Fab.)

ELATERIDÆ.

E. Candeze.

Mem. Liege, 2d. ser, vol. IX., 20. Febr. 1882.

Anchastus militaris n. sp. Cal. p. 59, *Elater violaceipennis* n. sp. Cal. p. 62, *E. Hornii* n. sp. Cal. p. 63, *E. partitus* n. sp. Cal. p. 63, *Corymbites Lecontei* n. sp. Cal. p. 94, *E. elegans* n. sp. Cal. p. 97.

[*Elater violaceipennis* = *atripennis* Horn, *E. Hornii* = *praeses* Cand; *Corymbites Lecontei* = *dimidiatus* Lec., teste Horn.]

MALACHIDÆ.

Geo. H. Horn.

Trans. Am. Ent. Soc. X.

Meconyctes n. g. (after *Dasytes*) p. 125, *M. omalinus* n. sp. Kans. p. 126.

CLERIDÆ.

S. Gorham.

Biologia Centrali Americana 1882.

Cymatodera texana n. sp. Tex. p.

MORDELLIDÆ.

J. B. Smith.

Trans. Am. Ent. Soc. X., pp. 73—

Pentaria hirsuta n. sp. Cal. p. 76, *Anaspis militaris* n. sp. Cal. p. 77, *Mordellistina elegantulus* n. sp. N. Y. p. 90, *M. atriceps* n. sp. N. Y. p. 91, *M. pilipennis* n. sp. N. Y., *M. pallipes* n. sp. N. Y. p. 92, *M. indistincta* n. sp. N. Y. p. 93, *M. incornata* n. sp. Tex., *M. minuta* n. sp. Da., *M. ferruginoides* n. sp. Ga. p. 94, *M. splendens* n. sp. Fla. Ills. p. 95, *M. floridensis* n. sp. Fla., *M. singularis* n. sp. Da. p. 96, *M. Schauppii* n. sp. N. Y., *M. aequalis* n. sp. Ills. *M. rufescens* n. sp. Nev. p. 97, *M. cinereofasciata* n. sp. N. Y. p. 98, *M. aethiops* n. sp. Col., *M. texana* n. sp. Tex.

Drop the genus *Glipe* Lec. (*G. hilaris* Say. is a *Tomoxia*.) *Anaspis luteicincta* Lec. (= *sericea* Mann.) *A. nigriceps* Lec. (= *rufa* Say.)

In *Mordella* drop *irrorata* Lec. (= *scutellaris* Fab.) *lineata* Mels. (= *marginata* Mels.); *jovalis* Lec. (= *oculata* Say.) *obliqua* Lec. (= *lunulata* Hellm.)

To *Mordellistina* add *dimidiata* Hel., *biplagiata* Hel., *intermixta* Hel., *bipustulata* Hel., *scalaris* Hel., *pubescens* Fab., *bihamata* Mels., *fuscata* Mels., *pityptera* Mels., *fuscoata* Hel., *M. angusta* Lec., *attenuata* Say., *discolor* Mels., *amula* Lec.

Drop *nigricollis* Hel. (= *trifasciata* Say.) *picicornis* Lec. and *cervicalis* Lec. (both = *comata* Lec.) *divisa* Lec. (= *marginalis* Say.)

RECORD ON COLEOPTEROLOGY FOR 1882.

II.

Proc. Am. Ac. Arts and Sciences. 1882, pp. 234—267.

Dr. H. A. Hagen.

On the Color and the Pattern of Insects.

Quarterly Journ. Bost. Zool. Soc. April 1882.

E. P. Austin.

Collecting Stylopidae. p. 12.

American Naturalist, 1882.

C. V. Riley,

Habits of *Cybocephalus*, p. 514.

Habits of *Polycæon confertus* Lec. Myrmecophilous (ant-loving)
Coleoptera, p. 747.

E. A. Schwarz.

Woodboring coleoptera [remarks on some], p. 823:

Mrs. A. E. Bush.

A new museum pest [*Perimegatoma variegatum* Horn], p. 826.

C. V. Riley.

Species of *Otiiorhynchidæ* injurious to cultivated plants, p. 915.

L. P. Gratacap.

Vitality of Insects in Gases. p. 1018.

Proceedings of the Western N. Y. Horticultural Society.

J. A. Lintner.

A new Principle in Protection from Insect Attack. (Auth. Edit.
pp. 1—15.)

Canadian Entomologist, (vol. XIV.)

Dr. H. A. Hagen.

The oldest figures of N. A. Insects, [account on *Jacob Petiver's*
Gazophylacium, *Insects from Md. and Car. 1695-1706*] p. 11.

J. Geo. Gehring.

Psephenus Lecontei. [Notes on its occurrence upon stones in
rapids], p. 72.

Ch. B. Dodge.

The Hop. Vine Borer? (Habits) p. 93.

John Hamilton

Remarks on *Agonoderus comma*, *pallipes*, *rugicollis* and *Tachycellus*
atrinedius, p. 104—106.

Geo. H. Horn.

[On the differences between *Cyllene pictus* and *robiniae*.] p. 240.

Psyche. (vol. 3.)

H. W. Turner.

Color of the Light emitted by Insects, p. 309.

G. Dimmock.

Circulation of blood in the larva of *Hydrophilus* (with cut.) pp. 324—327.

Note on *Catogenus rufus* pp. 341—42.

F. H. Snow,

A new Museum Pest, *Trogoderma tarsale* Mels. pp. 351—52.

Report of the Commissioner of Agriculture for 1881 and 1882.**C. V. Riley.**

The Rice-grub, (*Chalepus trachypygus* Burm.) Habits and nat. hist.] p. 128, t. VI. f. 5.

The Water-weevil, (*Lissorhoptrus simplex* Say.) p. 130, t. VI. f. 4.

The Corn bill-bug, (*Sphenophorus robustus* Horn) p. 138, t. VIII, f. 2.

The Clover leaf-beetle, (*Phylonomus punctatus* Fab.) p. 171, t. X, f. 1.

J. H. Comstock,

Ladybirds, (*Coccinellidae*) pp. 204—206, with plate, [Short description of the early stages of the Pacific coast species].

Bulletin Brooklyn Entom. Society.**F. G. Schaupp.**

Description of the larva of *Patrobis longicornis*. Say, vol. IV, p. 56.

Description of the larva of *Silpha americana* Lin. vol. V, p. 2.

On the Species of *Pterostichi*, p. 18.

Remarks on *Coleopterous pupae*, with plate, p. 18.

Biological notes on, and description of the larva of *Calosoma calidum* Fab. p. 33.

Chas. Fuchs.

Synopsis of the *Lucanidae* of the U. S. with plate and woodcuts. p. 49—52, 57—60.

J. L. Leconte, M. D.

Synoptic table of *Myis* Ziegl. p. 63.

Geo. H. Horn, M. D.

Syn. table of *Olisthopus* Dej. p. 63.

Also the Synoptic tables by Horn and Leconte of *Cymindis*, *Apri-stus* IV. 43, 44. *Blechnus*, *Tecnophilus* IV, 53. *Philophuga*, *Eucaerus* IV, 54. *Callida*, *Euprostus*, *Onota* IV, 55. *Badister* V. 7. *Selenophorus* V, 8. *Pterostichus* V, 15, 16, 23, 24, 31, 32, 39—42. *Pogonus*, *Patrobis* 47. *Anophthalmus*, *Trechus* 48. *Perigona*, *Lachnophorus*, *Euphercticus*, 63. *Atramus*, *Pentagonica*, *Coptodera*, *Phloxoxena* p. 64.

CORRECTIONS.

Page 69, 9th line: from bottom read *Philophuga* for *Philopuga*. — Page 70, 10th line: In some copies the word *pallipes* Lec. is not complete. — Page 71, 11th line from bottom and last line read *tarsale* for *tarsalis*. — Page 72, 5th line: read Fab. for Fa. — 11th line read *Anchastus* (poor print).

PHYCIODES. *Doubl.*

1. **P. Harrisii**, *Scudder*. *Male*: Upperside red fulvous, darker at base; broad borders of black, that on secondaries followed inwardly by a row of fulvous crescents surmounted by black spots; on primaries a heavy irregular median band of black and a sub-apical patch of same color; underside of primaries light fulvous with a marginal row of yellow crescents edged with black, the sub-apical patch and borders of cellular spots appear through faintly; of secondaries, red-fulvous with a marginal row of pale yellow crescents, a median and basal row of spots of same color, all of which are enclosed by black.

Female same as male. Expanse of ♂ $1\frac{1}{4}$ inch., ♀ $1\frac{1}{2}$ inch. New England, New York, Canada.

2. **P. Nycteis**, *Doubleday*. *Male*: Much the same as the above; the black spots on secondaries are followed interiorly by a slight black band; underside of primaries pale yellow-fulvous with apical and marginal patches of silvery white, of secondaries pale yellow, a broad margin of brown extending almost to near apex and enclosing the black spots; a basal row of silvery white patches as also an irregular row of marginal crescents of same color; the median region is also more or less silvered.

Female same as male. Expanse of ♂ $1\frac{1}{4}$ to $1\frac{5}{8}$ inch., ♀ $1\frac{5}{8}$ to 2 inches. England to Colorado, Montana, Texas, Canada.

3. **P. Carlota**, *Reak*. *Male*: Upperside much as *Nycteis*, but the black markings heavier and fringes checkered heavily with white; underside of primaries also much like *Nycteis*, but the ground color is more reddish and the black markings heavier, of secondaries ground color brown with silvery white markings, the median band much dentated.

Female; much like male. Expanse of ♂ $1\frac{1}{8}$ to $1\frac{3}{8}$ inch., ♀ $1\frac{3}{8}$ to $1\frac{5}{8}$ inches. Southern & Western States, Rocky Mountains, occasionally West Virginia.

4. **P. Tharos**, *Drury*. *Male*: Upperside bright fulvous with black markings rather slight except the borders; underside of primaries pale fulvous, brown at outer margin except in apical region, the heavy black markings appear through, of secondaries paler with slight irroration of brown and borders of same color,

Female: much the same as male. Expanse $1\frac{1}{4}$ to $1\frac{5}{8}$ inches. United States excluding Pacific States, New Mexico, British America, Southern Labrador, Nova Scotia.

Var.: **Marcia**. *W. H. Edw.* The black markings much heavier, especially from median field to base; underside of primaries more fulvous, secondaries much suffused with brown and mottled with white, sometimes a large white crescent in center of margin. Expanse same as *Tharos*.

5. P. Phaon, *W. H. Edw.* *Male*: Upperside, the ground color paler than in *Tharos* and black markings heavier, the median band on primaries yellowish; underside yellow shaded with pale fulvous on primaries, on which the black markings are very heavy.

Female: like male. Expanse of ♂ 1 to 1½ inch., ♀ 1¼ inches. Gulf States, Texas, Kansas occasionally.

6. P. Vesta, *W. H. Edw.* *Male*: upperside much like var. *Marcia*, but the black markings more equally distributed; underside pale yellow-fulvous, black markings slight.

Female: same as male, but paler. Expanse of ♂ 1½ inch., ♀ 1¼ inches. Texas.

7. Batesii, *Reak.* *Male*: Upperside much like *Tharos*, black markings very heavy; underside of secondaries uniform pale yellow, with a sub-marginal row of faint black spots.

Female: like male. Expanse of ♂ 1¼ inch., ♀ 1½ to 1⅝ inch. Virginia to New York.

8. P. Pratensis, *Behr.* *Male*: resembles "Batesii" on the upperside, but the ground color is paler and the black markings are lighter; underside pale fulvous, marked and spotted with yellow.

Female: is more heavily marked with black on the upperside, and the median bands as well as the marginal crescents are mostly pale yellow; the underside is more prominently marked than in the male.

Expanse of male 1⅝ inch., of female 1⅞ inch. Cal.; Or.; Ariz.

9. P. Camillus, *W. H. Edwards.* *Male*: very close to the above, the bands and spots on upperside are paler, and the dark markings on the underside are more pronounced.

Female: same as male. Expanse of male 1⅞ inch., of female 1½ to 1⅝ inch. Colorado, Rocky Mountains, Montana, Texas, Kansas.

10. P. Orseis, *W. H. Edwards.* *Male*: upperside bright fulvous, with heavy black markings; underside pale fulvous and marked like "Pratensis", to which both this and the preceding species are very closely allied. The *female* is paler, and looks like a dark "Camillas".

Expanse of male 1¼ to 1⅝ inch., of female 1⅞ to 1½ inch. Californ. Sierras, Oregon, Washington Territory.

Notice of an "Illustrated Essay on the Noctuidæ of North America."

By C. V. RILEY, M. A., Ph. D.

There has lately been published by John Van Voorst, of London, Eng., a work by the above title and prepared by Mr. Augustus Radcliffe Grote. The publisher has done his work most creditably, and given us four rather highly colored plates of some of our most conspicuous moths.

The text consists chiefly of second-hand matter, the original source, with one exception, not being given: while in the few original pages which adorn the "Essay" the author has seen fit to vent some of his wrath against the writer. As the work is particularly addressed to English entomologists among whom I count some warm personal friends, I have concluded to publish a few facts which, though widely known here, may not be so well known abroad. In doing this it will be unnecessary either to criticize the loose style or the irrelevant polemics of the prefatory portion of the volume, or to indulge in its unseemly personality.

Anent the Cotton Worm* Mr. Grote says, (p. 11) that he has watched this and different species of Noctuidæ, "from the egg to the moth stage" and then gives his observations which the reader is told are taken "from the Alabama Geological Report." There are several Alabama Geological Reports, but the one Mr. Grote refers to is that for 1875, and the natural history, as given in the "Essay" (pp. 11—15), is taken bodily therefrom, faults and all, with one important omission. This omission is significant in the light of his later writing, because it is the paragraph which commits him to the theory of the annual dying out of the species in the United States and its annual importation from more Southern countries—a theory credited to, "a series of observations in Southern and Central Alabama". The theory was, however, fully promulgated long before** and

* *Anomis xyliua* (Say.) or supposed *Aletia argillacea* Huebn. See remarks, p. 56 of Genl. Index and Suppl. to the Mo. Entomol. Reports. Mr. Grote has characterized these remarks as "disingenuous" (New Check List etc. p. 33, note). The simple facts are that my Bahia material, though more closely resembling Huebner's figures than Say's *xyliua*, was yet too poor to permit a positive decision.

** See Thos. Affleck, *Am. Agriculturist*, 1846, (Vol. 5, p. 342), D. B. Gorham; De Bow's Review, 1847, (Vol. 3, p. 535,) and W. J. Burnett, *Proc. Bost. Soc. Nat. Hist.* 1854. (Vol. 4, p. 316.)

is untenable, since the species, as I have fully proved* is a permanent resident of the United States. The natural history as given in the "Essay" is, in the light of recent observations essentially erroneous in all respects except where it deals with biological platitudes that were equally trite if applied to hundreds of other species. It furnishes no evidence, and, indeed, there is no evidence on record, that Mr. Grote ever watched the development of any species from the egg to the imago; and this is in keeping with the fact that early in his entomological career, he confessedly "abandoned collecting insects, even walking carefully so as not to bruise the golden rods and purple asters that fringed my path".** So far as *Anomis xyliua* (Say.) is concerned he has never added a single fact in relation to its habits not previously recorded, and the above confession, together with the evidence in his writings and his occupation while a resident of Alabama, all go to show that no serious observations were ever made by him in the field other than those made in 1878 under my direction.

Similarly misleading is Mr. Grote's statement that he was editor of the *Practical Entomologist* "for the first few numbers to be succeeded by the late B. D. Walsh". The article "*Cui Bono?*" consists of 14 lines, and the paper was edited by the publication committee of the Entomological Society of Philadelphia, consisting of three members (Mr. Blake whom Mr. Grote mentions, not being one of them) with Mr. Walsh as associate editor after the third number.

On p. 18 of the "Essay" Mr. Grote refers to the "rust" of cotton as a vegetable parasite, which is another evidence of lack of observation in the cotton field since the rust is caused by a mite. There is, on the same page, an insinuation that the injuries by the worm are overestimated by interested parties. So far as any estimates that I have used are concerned they are from the statistician of the Department of Agriculture, and I know of no higher authority. It is, however, on page 19 that the most reckless assertions and reflections on myself occur, for they assume the form of a personal attack that is pitiable. The only case instanced in justification for the abuse is that the assumed discovery by Mr. Townsend Glover, "of the attraction presented by the glands of the cotton plant to

* In a paper read before the National Academy of Science last May: see also my Ann. Rep. as U. S. Entomologist, 1882, p. 106.

** New Check List of N. A. Moths, p. 5.

the moth, etc." has been appropriated by me — which is simple falsehood. Mr. Glover figured the glands, but never wrote a word as to the attraction of said glands to the moth, and I was not only the first to suspect this connection, but to prove it by observation and to discuss its bearings.* As for Mr. Grote's utterances anent Paris Green, they are simply ludicrous as opposed to a general experience in this country of nearly a decade, and while I have nowhere claimed public gratitude as he falsely states, it is true that such has been generously expressed by the farming community for my humble efforts in connection with its safe and efficient use while his prejudiced opposition to it has met with derision not only from farmers and planters but from every other entomologist who has had practical dealings with insects. The closing paper of the volume entitled "a Colony of Butterflies" (which first appeared in the *American Naturalist* for March, 1876) has little of originality about it except the style, since both the facts and the theory had been set forth by Dr. A. S. Packard, Jr., in 1867** and by Mr. S. H. Scudder in 1874.***

It is needless to extend this notice. No one can regret more than the writer that Mr. Grote should so mar his work or so lay himself open to deserved criticism!

Washington, D. C., Jan. 10, 1883.

* *Atlanta (Ga) Constitution*, Sept. 20, 1878, and *Scientific American*, Nov. 15, 1878.

** The Insect Fauna of the Summit of Mount Washington as compared with that of Labrador, (Proc. A. A. A. S.; Vol. XVI, p. 156).

*** Distribution of Insects in New Hampshire (Chapt. XII, Final Report on the Geol. of N. H.)

The printing of the article by Prof. Riley in the present paper is a departure from the rules of the Bulletin, that no personalities shall be allowed in its columns. The present departure is made for the following reasons. 1st. Mr. Grote's writings are invariably of such a character that no rejoinder can be made without reference to his unsubstantiated personal assertions. 2nd. These assertions to which Prof. Riley replies are in an ephemeral publication and no other method of reply is open to him save through the columns of some other publication and justice, fair play and decency give him the right to a reply somewhere.

F. G. Schaupp.

New Mordellidae and Notes.

By John B. Smith.

Among the material recently sent me for determination in this group were several new species, and several varieties from localities from which they had not been previously recorded; proving thus that the species are very widely distributed.

Mordellistena erratica sp. nov.

Posterior tibia with a single, very oblique ridge, first joint of posterior tarsi also with a single oblique ridge. Color entirely black: cuneate; anal style short and truncate. 2 mm. Fla.

A single specimen in my collection: this species is curious and interesting by the structure of the posterior tibiae and tarsi: the subapical ridge of the tibia is indistinct, and the other ridge very strongly marked is very like that on the posterior tibia of *Glipodes*; the carina along the dorsal line is wanting however, and the palpi differ from that of the species of the latter genus. This species should head the list of those placed in this genus.

Mordellistena tarsalis sp. nov.

Posterior tibia with a single strongly marked oblique ridge entirely crossing the outer face, subapical strongly marked; first joint of posterior tarsi with *two* oblique ridges. Form stout, cuneate: black; mouth, margins of thorax and a broad vitta on elytra orange yellow: legs except posterior tibia pale. $1\frac{1}{2}$ mm. Texas.

A single specimen in my collection. This species connects the preceeding with the others of this genus and it should follow immediately after it in the list.

Mordellistena pratensis sp. nov.

Posterior tibia and first and second joints of posterior tarsi each with two short oblique ridges: all distinctly marked. Body black, elytra golden yellow with fine sericeus pubescence; suture and side margins narrowly fuscous; legs all pale. Length $1\frac{1}{2}$ mm. Fla.

A single specimen in my collection differing from all others in its group by the color of elytra: it should follow in the list immediately after *elegantulus*.

Mordellistena fusco-atra Hel.

Of this species I found a single specimen among my New Jersey collections: it is the first specimen of the species I have seen and agrees in all respects with Dr. Helmuth's description.

Mordellistena splendens nobis.

Of this species I received a specimen with some material sent me for determination: it agrees in all respects with the type, and was collected in Pennsylvania: the type is from Illinois, and the only other specimen known to me is from Florida: the species has thus a very wide range.

Fertile eggs from a dead *Arctia virgo*.

About the middle of July I captured a ♀ specimen of *Arctia virgo* and obtained about a dozen eggs. As the specimen was useless for the cabinet, having lost half a wing, I dissected the abdomen and found about fifty eggs therein, sticking together. Having washed them with tepid water, I put them in a hatching-box and about twenty young larvae made their appearance in due time. Could the same thing not be done, when capturing a poor ♀ of a rare species?

F. G. Schaupp.

Habitat of *Melitaea Colon* and *M. Perdiccas*, W. H. Edw.

In reference to the locality where the two above species were taken by Mr. H. K. Morrison in 1880, I beg to correct an error made by the author. Mr. Edwards states that both species were taken at Mount Hood, Oregon, see *Papilio* Vol. I, No. 4, p. 45 and 46. Mr. Morrison sent them to me as found in Washington Territory, and on my writing him on the subject he replied that they were not taken in Oregon, but as follows: "*Melitaea colon* is found on the bluffs of the Columbia river, at Kalama, and other points in Western Washington Territory. *Melitaea Perdiccas* is found on the little prairies, of which there are a good many in Western Washington Territory, near the coast; I got it at Tenino near prairies." To collectors who make a record of localities of species this may be of interest.

February 1880.

Fred. Tepper.

A lost locality.

In the suburbs of Brooklyn there was a small pond about 300 feet long and one hundred broad, the only locality, where we used to find *Lophoglossus strenuus* Lec. under stones at the edge of the water: this pond has been laid dry and although several other small ponds are very close, yet not a single specimen of *Lophoglossus* has been found during the last two years, in spite of careful researches.

Chas. Fuchs.

Collecting Noctuidæ in day time.

By John B. Smith.

Some of the moths which I have always taken in abundance and which I considered rather common, seem to be very poorly represented in other collections, and from the statements of the time and place of the capture of specimens I find that they were only accidental captures and not the result of systematic search.

The term *Noctuidæ* and the general statement that moths fly only at night seem to have misled many, and to have prevented their searching in the day; yet of those species that appear after midsummer a very large proportion can be found during the day. The golden rod especially is productive: I have in one afternoon taken fifty or even more *Agrotis pychrois*, and an even larger number of *A. subgothica*, with its varieties, *trivosa* and *herilis*. *A. clandestina* was more occasionally found, and *A. redimicula*, was found at the general rate of one a day. *A. messoria*, I have found in similar situations. *Agrotis murænula*, *A. Bostoniensis* and *A. scandens* I have of ten found: *A. gladiaria* with its strong robust body and short wings, I never found elsewhere. Several others, and nearly all good species I have found in the same places: I never pass a clump of golden rods without careful examination: several species of *Mamestra* and *Hadena* are more occasionally found. *Heliothis armiger* is common, and I have taken some very pretty varieties: *Nephelodes violans* and *N. minians*. I have also caught, flying rapidly and somewhat after the manner of some *Sphingidae*. Three species of *Plusia* are abundant, and some of the *Deitoids* occasionally settle on it. Few of the enumerated species are found in the morning but from 1 P. M. when the sun is strongest until the twilight appears, its pays to collect.

Some of the *Zygenidae* are also to be found: *Licomorpha pholus*, *Ctenucha Virginica*, *Harrisina Americana* and *Scepsis fulvicollis*, I have found the latter no where else. In early evening *Clematis* should be examined, *Sphingidae* and many *Noctuids* and some of the *Arctians* frequent it. After dark the lantern goes to the golden rod and flowers of the milk-weed; to the latter *Geometridæ* are attracted: I have seen six or more on a single clump of flowers.

In fine all flowers should be carefully examined during the day: many good species will repay the toil expended.

On the occurrence of *Amphicoma*.

Extract from a letter.

I found *Amphicoma* [*Dasydera*] *ursina* Lec., which has always been very rare, last year in numbers from June 17th to June 30th on one of the large sand Dunes west of San Francisco, within a mile of the Ocean beach. I visited the place three times and found that up to 10 a. m., whilst the cold, foggy wind was blowing, but few were visible, a few were caught squatting on the sand. — When the wind lowered somewhat and the sun came out, dozens of them made their appearance, flying very low over the long, flat expanse of perfectly clean sand. —

Their flight, like that of various *Sphingidæ* consisted of very rapid darts; sometimes, however, they would fly in a long straight line, but always with great rapidity and from six to ten inches above the sand. — Though armed with a long-handled net, I found them difficult to capture. — Several times I caught a female pursued by two males. — Several times when captured on the sand they would endeavor to bury themselves out of sight. — Have always considered this insect rather rare, and think the fact of seeing upward of a hundred of them in a single locality, the result of a successful brood rather than owing to any general abundance of the same. — On July 16th I visited the place again and found but one specimen alive, though numerous remains of others were visible, and seemed to indicate that the season, for this species, was over.

E. J. Ricksecker.

Exactly under the same circumstances *Amphicoma* (*Lichnanthe*) *lupina* Lec. has been found several years on the sand in Coney Island during the month of June, either creeping on the wet sand near the water marks or dead about half a mile distant from the sea. A few years ago I found 50 dead but perfect specimens nicely dried by the sun on a small sandhill.

The time of their appearance is very limited, about two weeks in June; and just as limited is the special locality, on the shore near the Ocean Hotel, a few hundred feet long, where the live specimens were found and the dead ones just behind that part of the shore, driven up the low sandhills by the wind.

I have been on Coney Island to look for them about fifty times, but succeeded only five times to secure them.

I always considered these handsome coleoptera driven by the wind from the Jersey coast, as they were usually found after a heavy storm from Southwest — but it is still possible, that they are indigenous to the Island.

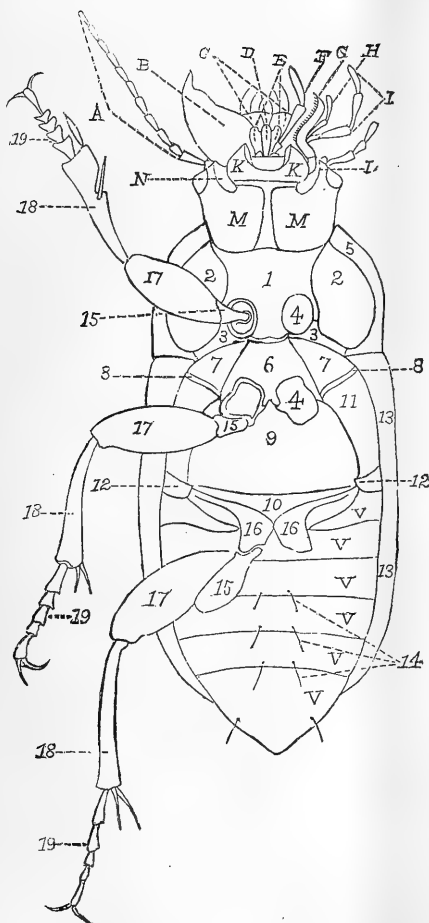
F. G. Schaupp.

HARPALUS CALIGINOSUS. Fab.

WITH DETAILS

BY

H. G. HORN, M. D.



- A. Antennæ;
 B. Mandible;
 C. Labrum;
 D. Ligula;
 E. Paraglossæ;
 F. Labial palpus;
 G. Maxilla, inner lobe,
 H. „, outer lobe;
 I. Maxillary palpus;
 K. Mentum;
 L. Genæ;
 M. Gula, with the gular sutures;
 N. Buccal fissure;
 V. Ventral segments.

1. Prosternum;
 2. Prosternal episternum;
 3. Prosternal epimeron;
 4. Coxal cavity, closed behind;
 5. Inflexed side of pronotum;
 6. Mesosternum.
 7. Mesosternal episternum;
 8. Mesosternal epimeron;
 9. Metasternum;
 10. Antecoxal piece;
 11. Metasternal episternum;
 12. Metasternal epimeron;
 13. Inflexed side of elytron;
 14. Ambulatorial setæ;
 15. Trochanters;
 16. Posterior coxæ.
 17. Femora;
 18. Tibiæ;
 19. Tarsi.

It affords us great pleasure to present to the Coleopterists among our readers the above cut, which we owe to the kindness of Dr. Horn. The same figure has been prepared for Dr. Leconte and Horn's new Classification of Coleoptera which will be issued in about a month.

F. G. S.

PHYCIODES. *Doubl.*

11. P. Mylitta, *W. H. Edwards*. *Male*: upperside fulvous with black markings slight; the underside is very much like "Tharos, var Marcia."

Female: like male, with the ground color generally paler.

Expanse of *male* $1\frac{1}{8}$ inch., of *female* $1\frac{1}{4}$ to $1\frac{1}{2}$ inches. California, Arizona, Washington Territory.

12. P. Montana, *Behr*. Upperside close to "Vesta", black markings somewhat heavier; underside pale yellow fulvous. secondaries paler and marked like „*Batesii*".

Expanse $1\frac{3}{8}$ inch. California, Sierras, Lake Tahoe.

13. P. Picta, *W. H. Edwards*. *Male*: upperside resembles "Phaon" very closely; underside of primaries fulvous in the median field; base, costa, apex and outer margin pale yellow, black markings prominent; of secondaries pale yellow, immaculate.

Expanse about $1\frac{1}{8}$ inch. Colorado, Nebraska, Arizona.

14. P. Canace, *W. H. Edwards*. Upperside fuscous, marked and spotted with fulvous, as in *Montana*, Behr; the third band from hind margin rather yellowish. Secondaries wholly pale ochraceous, a sub-marginal row of brown dots, obsolete beyond middle of disc.

Beneath much like '*Batesii*' Reak., but wants the reticulations which ornament that species,

Expanse 1.3 inch. *Hab.* So. Cal.

Synopses of Butterflies.

With this number we continue our synopsis of the butterflies in a somewhat different form from that heretofore adopted; we shall present in a tabular form the chief differences between the species in such manner as will most readily enable the student to place an insect new to him if he can assign a generic location to his species. The genera will be briefly described having regard more to their most evident superficial character than the scientific limitation.

Followings the synopsis there will be in each case a Bibliography of the species, which there will follow in the order to be adopted for the Cabinet arrangement. The Bibliography is not intended to be complete; we shall give the place of original description, the work in which the species was referred to the genus in which it is here placed and if possible some popular and well known work where it is figured will be cited. For a full

Bibliography we must refer the student to the catalogues of Messrs. W. H. Edwards and Hermann Strecker. Reference to a work in which the larva of each species has been described is given where the larva is known, with the name of the food plant where known; works such as Harris' Insects Injurious to Vegetation (Flint's Edition) are cited as much as possible because best known. We shall also give in most cases a brief note to the species giving its principal characteristics in addition to those indicated in the synopsis and variations will be here noted and the view of whoever may be the author of the synopsis as to the validity of the species, variety or the generic reference will be there given.

We hope in this way to enhance the value of the synopsis to Lepidopterists and to give them in brief the results usually only obtained by reading long descriptions,

John B. Smith, Editor.

VANESSA, Fabr.

In this as in the allied genera the body is robust and clothed with rather thin long vestiture; the abdomen is short: palpi oblique well exceeding the head and lengthily fringed: antennæ with an elongate, obtusely terminate and slightly flattened club. The anterior legs are as in the others of this group imperfectly developed. Wings angulate; primaries produced at outer margin one third from apex and slightly so near hind angle; fringes between, dentate; secondaries with a short tail-like prolongation at middle of outer margin. The usual groove for the reception of the abdomen.

The wings beneath are destitute of silvery marks or characters and the species are thus readily distinguished from *Grapta*.

They may be known as follows:

Wings dark brown with a yellow or buff border. **Antiopa.**

Wings tawny or yellowish red with a black border: three black costal and two central spots on primaries. **Californica.**

Wings dark brown with a broad yellow red subterminal band on both and two reddish costal spots on primaries. **Milberti.**

V. Antiopa, L. Bd. Lec. 173; Harr. 296, fig. 121: Var *Lintnerii* Fitch 3rd Rep. N. Y. Agr. Soc. 211.

The *Lintnerii* variety has the marginal yellow band much wider sometimes extending to nearly the middle of the wings and always lacks the blue spots which in the normal form follow the buff yellow band inwardly. It is an aberration rather than a variety and is found only occasionally. The caterpillar is well known and has been figured and described by Harris. It feeds on willow, poplar and elm.

Expands 3 to 3½ inches. *Hab.* Europe and America.

V. Californica, Bd. Ann. Soc. Ent. Fr. 2, 10, 306.

Easily distinguished by the reddish wings bordered with black. The caterpillar has been described by Dr. Behr and Mr. Hy. Edwards in the Proc. Cal. Ac. N. Sc.

Expands 2 to 3 inches. *Hab.* Cal., Or., Col.

V. Milberti, Gdt. Bd. Lec. 187 pl. 50, Harr. 302, fig. 125, *furcillata*, Say. Ann. Ent. 2, pl. 27.

Distinguished from both the preceeding by the broad transverse buff band crossing both wings. Harris describes the caterpillar as common on the nettle (p. 303).

Expands 2 to 2½ inches, *Hab.* No. and Nw. U. S., Can. Nov. Sc.

PYRAMEIS, Hb.

This genus very closely resembles *Vanessa* in superficial appearance, but the wings are never angulate. The ornamentation of secondaries beneath tends to become ocellate, and in most of the species is so.

They can be separated as follows.

Ground color of wings black or smoky.

Secondaries with a yellow outer margin; primaries with an oblique fulvous band from costa near base to hind angle; several white spots near apex.....

Atalanta.

Ground color of wings tawny or reddish.

Secondaries beneath with several small ocellate spots near outer margin.

Primaries with a narrow black band entirely crossing middle of discal cell.....

Carye.

Primaries without the black band in discal cell but a black spot from upper and lower boundary approaching but never joining to form a complete band.....

Cardui.

Secondaries beneath with two large ocellate spots near outer margin.....

Huntera.

P. Atlanta, L. Syst. Nat. Ed. X. p. 478 (*Papilio*) Hb. Verz. 33, (*Pyrameis*); Harr. 294, f. 120.

Well known as the Admiral Butterfly in both Europe and America, and unique by the bright reddish complete band obliquely crossing the primaries, and by the paler fulvous outer margin of secondaries.

The larva is well known and has been often figured and described. (Harris 294). It feeds on nettles and hops.

The butterfly is widely spread and is found throughout Europe, America and No. Africa. Expands 2 to 3 inches.

P. Cardui, L. Syst. Nat. X, p. 475, (*Papilio*) Doub. and Hew. Gen. Diur. Lep. 1; 205, (*Pyrameis*) Harr. 291 f. 118.

This and the two following species have one general style of marking above: The apex is black and contains a submarginal row of white spots and a longer white dash beginning on costa $\frac{1}{3}$ from apex and extending

obliquely $\frac{1}{2}$ the distance to the outer margin. The discal cell is more or less maculate with black and there are a number of black angular blotches so arranged as to form an interrupted oblique band from the costa near base to the inner margin near hind angle: the outer margin narrowly black: Secondaries with a row of small ocellate black spots near outer margin.

The larvae (Harris 291) are found on the thistle, sunflower, hollyhock, burdock and other rough leaved plants. Expands 2 to 3 inches. *Hab.* America and Europe.

P. Carya, Hb. Sam. Ex. Schm. I, (*Hamadryas*) Doub. and Hew. Gen. Diur. Lep. I, 205, (*Pyrameis*).

Differs from the preceeding by the more dull color of the wings which never have the roseate tinge almost universally present in *Cardui*, by the smaller size, and by the complete black band crossing the middle of discal cell of primaries.

The larva is described by Mr. Hy. Edwards (*Proc. Cal. Ac. N. Sc. III*, 125) and feeds on *Malvaceae* and *Urtica*. Expands 2 inch. *Hab.* Cal., Nev., Ariz. and Mexico.

P. Huntera, Fab. Syst. Ent, 499, (*Papilio*) Doub. and Hew. Gen. Diur. Lep. I, 205; Harr. 292 f. 119.

Resembles the preceeding but is evidently distinct from it and all others in this genus by having only two very large ocellate spots near hind margin of secondaries beneath. The caterpillar resembles that of *Cardui* and feeds on the same plants. (Harris 292). Expands 2 to 3 inches. *Hab.* Can., N. S., Mex. and Centr. Am.

JUNONIA Doub.

The generic characters are much as in *Vanessa* but the primaries are not at all angulated and but slightly excavated below tip. The club of the antennæ is shorter broader and much more flattened. The only species is:

J. lavinia, Cram. Sm. Abb. 1 pl. 8; Harr. 293.

Wings smoky; primaries with a large ocellate black spot centred with blue near middle of margin; two reddish spots in discal cell and an oblique white band from costa toward but not reaching the outer margin. Secondaries with 2 large ocellate spots near margin and a narrow reddish subterminal band. Beneath pale: ocellate spot of primaries reproduced. Secondaries with 2 small ocellate spots.

The species found here is generally considered to be the variety *coenia* and not the typical *lavinia*.

Expands 2 to 2½ inches. *Hab.* Mid. and So. Sts.

Collecting on the shores of Long Island Sound.

I have devoted considerable time to collecting Lepidoptera on the shores of the Sound in the neighborhood of Glencove, L. I., and wish here to give a short record of my experience. One would imagine that the shore, where but few trees and only a scanty growth of vegetation in general are found, would be a very barren and unpromising field, entomologically speaking in our branch. This was my impression when first visiting the spot. Nothing but sand, reed grass, and small stunted plants are open to view. The place however had a great attraction and charm for me, the placid waters of the Sound studded here and there with white sails, and the opposite shores of Connecticut standing out in bold relief against the summer skies, presenting a picture worthy of an artists' study. A number of years ago I had the opportunity to spend an entire season at Glencove, and almost every day would find me taking my accustomed walk along the shore. But my ideas that it was a poor collecting place were soon dispelled, and my interest in the locality naturally only increased.

The first insect that attracted my attention was "*Syneda Graphica*, Huebn."; the first brood of this little beauty, which, as far as my observations go, is the more numerous, appears from the beginning to middle of May, and the second one beginning of August; they take refuge under a little plant which grows close to the ground, but are easily disturbed, when off they go in a wild flight, and it requires some experience to follow them successfully; when settling on the ground after flight, they run a short distance and seem to take delight in basking in the sun before settling down again. I have taken as many as 30 to 40 specimens in an hour. —

Towards end of May on the salt meadows adjoining the shore "*Doriodes acutaria* H. S." can be taken, sometimes in numbers; their flight is slow and heavy and they are consequently easily captured.

At about the same time, say on May 20, 1877, I found in this locality two specimens of a new *Leucania*, "*L. Flabilis*, Grote", but have not been fortunate enough to find it again.

Later on again, in the beginning of July, "*Oncocnemis Riparia*, Morr," makes its appearance; this species I have also found in August. As mentioned in a previous note in the Bulletin, the capture of this insect is of interest, because all the other species of this genus seem to inhabit mountainous districts; as I have taken "*Riparia*" in the same locality for a number of years, it would appear that it is indigenous to the place, and was not wafted thither by chance.

Another interesting capture which I made here is "*Plusia Octo-scripta*, Sanborn", a species I believe not often met with in the low-lands; this specimen was taken on August 23d, 1874.

In August I found "*Omnatostola Lintneri*, Grote", hidden, the same as "*O. Riparia*", in the crevices of the few bathing houses that dot the beach; this would seem to be an exceedingly local species, as I have not heard of its being taken any where else.

In August also I took "*Agrotis Geniculata*, G. & R." quite a rare species. About the middle of September "*Heliothis Spinosae*, Guen.", a beautiful little insect, can be found in the same localities in which "*S. Graphica*" abounds. At the same time "*Agrotis pitychrous*, Grote" and "*Agrotis Muraenula*, G. & R." are on the wing and can be taken in numbers; these species frequent the flowers of the golden rod which skirt the meadows.

My work in this locality was confined to day collecting, but I feel assured that good results would be obtained from an attempt at sugaring, and I intend to make the trial the first opportunity I get.

In conclusion I would mention that the last specimen of "*Pieris Protodice*" Bd. L., a species which about 20 years ago was almost as abundant as "*P. rapae* L." is now, but which this latter species seems to have entirely displaced, was taken in this same locality, on the shores of Long Island sound.

March 23, 1883.

Fred. Tepper.

A new Collecting ground.

In the fall of last year two *Catocalas* which proved to be *C. Unijuga* Walker, were taken in mid-ocean, off the coast of Newfoundland aboard a steamer on its way to Europe. My friend Mr. Snellen kindly presented me with one of them. Entomologists on their way to Europe should not forget when leaving land behind them to continue their vocation till they reach *terra firma* on the other side of the big pond, seeing that species can there be caught which are not so common even in the woods.

A. W. P. Cramer.

Note on the Habits of *Amphicoma vulpina*.

During many years collecting I have met occasional specimens of *Amphicoma vulpina* in this locality (Lowell, Mass.) sometimes flying but oftener clinging to tall grass. Two years ago last summer early in July I noticed them flying as observed by Mr. Ricksecker of *A. ursina*, in considerable numbers at five o'clock A. M. over a low sandy tract bordering the Merrimac River under the shade of trees and I suspect that it will be found that other species are equally early risers.

Fred. Blanchard.

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Also 12 pages of Explanations of terms (concluded.)

Corrections.

The pages of Smith's synopsis of Noctuidae are wrongly paginated after 19 it ought to read 20 and 21 not 14 and 15, and pages 33, 34, 35 and 36 should read 35, 36, 37 and 38.

p. 70 For *Canthridus* read *Canthydrus*.

p. 71 For H. J. Jayne read H. F. Jayne.

p. 72 E. *Hornii* is = *dimidiatus* Lec.

C. *Lecontei* is = *praeses* Cand.

For E. *elegans* read C. *elegans*.

For *Mecomycetes* read *Mecomycet*.

For S. Gorham read H. S. Gorham.

After *Cymatodera texana* n. sp. Tex. p. add 134.

p. 81. 9th line from bottom read February 1883, instead of 1880.

p. 84 The name on top of figure of *Harpalus calaginosus* is of course not H. G. Horn, but G. H. Horn.

BULLETIN

—OF THE—

Brooklyn Entomological SOCIETY.



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BULLETIN

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BROOKLYN, MAY, 1883.

No. 1.

SALUTATORY.

Some ten years since there was formed in the City of Brooklyn, N Y., the 'Brooklyn Entomological Society' composed of most of the Entomologists of Brooklyn, New York, and its vicinity.

In 1878 the society felt itself strong enough to begin the publication of a "Bulletin" designed to perpetuate the observations of its members, to make known to others the results of their studies and also to gather together the descriptions and synopses of the genera and species of both Coleoptera and Lepidoptera for their own, and for the information of others.

These aims have been kept constantly in view and the publication has been continued to date, and No. 1, of the 6th Volume is now presented to you. It has steadily increased in favor and has gradually enlarged its list of subscribers so that the society which is now probably the strongest in point of numbers of any of its kind in the United States has concluded to enlarge it to 12 pages per number, each number having heretofore consisted of eight pages, the subscription price to remain as heretofore one dollar per volume.

They desire also to increase the value of the publication by giving more plates or illustrations than they have heretofore been able to give, and to this end they desire the support of every Entomologist and Naturalist in America — or elsewhere.

We believe it to be matter of great difficulty if not impossible to find any publication which in the same space and for the same price gives so much valuable matter, and the success that our little "Bulletin" has heretofore had encourages us to believe that our future efforts to give four pages additional of equally valuable matter with each number will meet with the cordial support of all persons interested in the progress of Entomology. We do not expect nor desire to make money by its publication, but simply to pay expenses: we ask no donations nor gifts, but simply a subscription for which we will give you such value in the way of Entomological information as lies in our power.

In this volume we shall have in an early number a synopsis of the *Cicindelidae* of boreal America, with four colored plates illustrating all the species; we shall probably complete our synopsis of the carabid genera, and shall have many articles on Coleopterous larvae and how they may be found and raised. We shall continue our synopses of diurnal Lepidoptera and shall probably have a synopsis of the *Deltoideae*. Descriptions of new species and articles of general interest besides the usual notes and notices will be also given and the attempt will be made to render the "Bulletin" valuable not only to the advanced student, but to the beginner first seeking for light in our favorite science.

The Bulletin will not be the organ of any one person, but will have contributions from well known Entomologists, and will also publish any notes, records of captures, curious experiences &c. of general interest, which may be sent in by our subscribers.

We do now respectfully ask your continued subscription to our "Bulletin" in aid of this work: we sincerely believe that you will have no reason to regret any aid you may thus furnish.

Please send in the subscription price, \$1.00 to the "Brooklyn Entomological Society" Box 90, Station W., Brooklyn N. Y. Money orders should be made payable to the society at Brooklyn N. Y.

Brooklyn, May 1883.

The Publication Committee of the
Brooklyn Entomological Society.

Mordellidae, Notes and Descriptions.

By John B. Smith.

Mr. Henry Ulke of Washington has recently sent me for determination an exceedingly interesting little lot of *Mordellidae*, among them a few new species unique in the arrangement of the tibial ridges: the insects are as follows.

Anaspis militaris nobis. No. 1; from California: this is the second specimen I have seen, and it differs from the type in the paler color and the much larger and less distinctly outlined humeral spots.

Mordella carinata sp. nov. Form robust, anal style slender; last joint of maxillary palpi scalene triangular: posterior tibia with a subapical ridge as usual in this genus, and with a carina along the dorsal line extending the full length of the tibia. Black: Thorax pubescent with three large black spots: Elytra with an indistinct rufous humeral lunule; two spots of whitish pubescence on each elytron near middle, and a narrow band of similar pubescence near apex: beneath, pectus and margins of abdominal segments pubescent. 5 mm. *Hab.* Florida, Tex. La. Several specimens.

This species is interesting because of the carina on the dorsal line of the posterior tibia, which allies it closely with *Glipodes* from which however it differs in the finely granulate eyes. Mr. Ulke's number is 2.

Mordella flaviventris sp. nov. Form slender; anal style elongate palpi and posterior tibia as in the preceeding: first joint of posterior tarsi also with a subapical ridge and dorsal carina. Black; head and thorax yellow, the latter sometimes black on disc: elytra with a transverse spot before, and another behind the middle, yellow, the posterior paler. Anterior and middle legs and posterior tarsi fulvous, as are also the last dorsal and ventral segment except the base of the anal style. 4 mm. *Hab.* Texas and Florida. 2 specimens.

A very pretty species and very readily distinguished, not only by the tibial and tarsal ridges but also by the maculation of the upper side which somewhat resembles that of *M. discoidea*. Mr. Ulke's numbers are 3 and 4.

Mordellistena bicinctella Lec. Nos. 5 and 6 (Texas) and 23 (Dist. Col.) I had previously seen only one specimen, Dr. Leconte's type. The species appears to be exceedingly variable and the specimens are all more or less different from the type while doubtlessly referable only to this species.

5 has the elytral bands pale yellow, and the thorax entirely black;

6 has the elytral bands more reddish and the thorax yellowish red with a darker cloud at base :

23 lacks the elytral bands entirely and has the anterior half of thorax red and the posterior half black ; this latter is an extreme variation, but is I believe a variation merely. It would be interesting to get a large series of this species with the view of finding the range of color variation.

Mordellistena aspersa Mels. No. 7 San Diego, Cal. Our most common form varying in the color of the head and anterior legs and in the depth of the black on the upper surface which in the specimen before me is intense and somewhat shining.

Mordellistena æqualis nobis. No. 8 California. The second specimen I have seen and it agrees in all respects with the type from No. Ills.

Mordellistena conformis sp. nov. Posterior tibia with *three* first joint of posterior tarsi with *four* second with *three* oblique ridges. Body and elytra black, head and thorax rufous. 6 mm. *Hab.* Texas.

This adds another to those species in which the head and thorax are wholly or partly red or yellow and the elytra and body are black. The tibial and tarsal ridges are exactly as in *M. æqualis*, and it is possible though not probable that at some future time this will be accounted only a variety of the preceeding. As species go now this is entitled to rank as such. 2 specimens ; Numbered 9 and 10.

Mordellistena comata Lec. No. 11 Florida. This specimen is like the type of *comata* ; the pubescence is pale and the color of the head and thorax is of a pale brick red. *M. picicornis* and *M. cervicalis* which I have referred as synonyms of this species have the pubescence darker and the red of the thorax more intense.

Mordellistena morula Lec. No. 12, D. C. and 18 Col. These specimens have the pubescence paler than any I have heretofore seen.

Mordellistena hirticula sp. nov. Posterior tibia with *three*, first joint of posterior tarsi with *three* second with *two* oblique ridges : Body black, elytra fuscous, densely covered with pale cinerous pubescence, except a scutellar space, a narrow median and a somewhat broader subapical fascia which are naked ; the median fascia in one of the specimens is incomplete : Beneath the body is clothed with rather coarse and long hair. $3\frac{1}{2}$ to 4 mm. Texas. La. 2 specimens. 14 and 15.

Obviously distinct from all the other species by the arrangement of the pubescence and markings.

Mordellistena rufescens nobis No. 16 La. Agrees in all respects with the type in Dr. Horn's Collection.

Mordellistena unicolor Lec. No. 17 Dac. This is a pale form of the species which varies from black to pale yellow : I succeeded last season in collecting a goodly series showing many varieties.

Mordella immaculata sp. nov. Terminal joint of maxillary palpi broad, securiform : Slender ; entirely black-suture narrowly clothed with white pubescence, else immaculate. 6 mm. *Hab.* D. C. No. 19.

This species is the most slender of those in this genus and is readily distinguished from the others by this character. The form of palpi allies it most nearly to *insulata*.

Mordellistena aethiops nobis, No. 28 & 29 Col. Neb. Agree in all respects with my types.

Mordellistena aemula Lec. No. 22 Kansas. The second specimen I have seen. Readily recognized by its large size and mottled elytra.

Mordellistena suturella Hel. Nos. 25 & 26, Col. & D. C. These are the first specimens of the species I have seen. The tarsal ridges seem indistinct, and I at first thought the specimens to be *aethiops*, but the sutural and marginal pubescence may be relied upon to separate the two by superficial examination.

SYNOPSIS OF BUTTERFLIES.

Limenitis, Fabr.

Head narrower than thorax ; eyes large prominent ; palpi moderate, a little longer than the head ; last joint much shorter than the preceding, obtuse ; antennæ nearly as long as the body, insensibly enlarging into an elongate club ; wings wide, always destitute of ocelli or tail-like prolongation.

Wings fulvous with black nervures..... **missippus**.

Wings black.

Without white band on wings..... **ursula**.

With white transverse band on primaries ; faint..... **var proserpina**.

With white transverse band complete on both wings.

A submarginal row of blue lunules followed by a row of rounded fulvous spots on primaries..... **var arthemis**.

A submarginal row of white lunules on primaries ; fulvous spots wanting **Weidemeyerii**.

Transverse bands with a yellowish tinge, apex and outer margin nearly to hind angle fulvous **Lorquini**.

1. **Misippus** Linn. Mus. Lud. Ulr. Reg. p. 264 (*Papilio*) ; Fabr. Syst. Ent. 481 (*Limenitis*) ; Harris fig. 109, *Disippus*, Godt.

Upper side fulvous with edges and nerves black ; outer edge of black containing row of white lunules. A white spot $\frac{1}{2}$ up costal band of forewing and 3 or 4 in a black triangular space $\frac{2}{3}$ up costa. Hind wings with narrow black band from inner to anal margin beyond middle ; Under side fulvous paler on tip of fore and on hind wings. Two rows of white lunules in outer edge of black, the outer smallest. Antennæ black, palpi black white in front, body black with lateral white. Larva on willow, (Harris 208).

Expands 3 to 3 $\frac{1}{2}$ inch. U. S. East of Rocky Mts.

Var. **Floridensis**. Strecker, Butt. and Moths N. A. p. 143; *Eros*, Edw.

Ground color much darker; same below as above; an edging of white spots to black median band on secondaries beneath.

A knowledge of Mr. Strecker's types shows his *floridensis* and Mr. Edwards *eros* to be the same. It is undoubtedly a variety of *misippus*. Florida.

Var. **Obsoleta**, Edw. Pap. II, p. 22.

Same as *misippus*, but with the white spots within black band beneath on secondaries. Arizona, Long Island.

Var. **Hulstii**, Edw. Pap. II, p. 17.

As *obsoleta*, but with black triangle and spots within wanting. Arizona.

Var. **Nigra**, Streck., Butt. and Moths. N.A. p. 143.

Black replacing fulvous of upper surface.

Var. **Pseudodorippus**, Streck., But. and Moths. N. A. p. 143.

Subapical triangle and black median band of secondaries wanting.

Of the above *floridensis* and *Hulstii* are probably the only good varieties, the rest being casual variations or aberrations.

2. **Ursula**, Fab. Ent. Syst. 3, 1, p. 82. *Astyanax*, Fab. *Ephestion*, Stoll.

Wings black or blackish-brown above with two rows of bluish lunules near outer edges. Within these a band of larger russet and blue spots; the russet prevailing on fore wings. Beneath color more brownish ; black band on margins ; row of lunules as above ; inner band of spots all russet. Two russet spots near base of fore, 4 near and at base of hind wings. Wings especially the hind ones generally with sheen of blue.

Antennæ black ; palpi white in front ; abdomen black with lateral white line. U. S. Larva on willow, cherry, apple etc. (*Harris* 283).

Var. Arthemis, Dru. Ill. Ex. Ent, II, t. 10, *Harris* 121, f. 7.

With broad median band of white across wings above and below, separated into spots by the nervures.

Var. Proserpina, Edw. Pro. Ent. Soc. Phil. V. p. 148.

An intergrade between the two forms above, the median white band being faintly apparent.

Var. Arizonensis, Edw. Pap. II, p. 22.

Wings more produced, one row of marginal lunules only. Arizona.

Var. Viridis, Streck., Butt. and Moths. N. A. p. 144.

With sheen green, instead of blue on upper surface.

Var. Rubidus, Streck., Butt. and Moths. N. A. p. 144.

Blue of upper surface replaced by fulvous.

Expanse $2\frac{3}{4}$ to $3\frac{1}{2}$ inches.

3. **Weidemeyerii**, Edw. Proc. Acad. Nat. Soc. Phil. p. 162.

Upper surface black. White extra median band divided by black nerves. One row of small marginal spots. 3 or 4 subapical white spots on fore wings. Beneath as above on fore wings but with two fulvous spots near base ; two rows of submarginal lunules on all wings. Hind wings with row of fulvous spots within rows of lunules ; basal portion marked largely with bluish white cut by the black into various shapes.

Pacific States, West of Rocky Mts.

Var. Sinefascia, Edw. Pap. II, p. 22.

As the name implies with white band wanting.

Expands 3 to $3\frac{1}{2}$ inches.

4. **Lorquinii**, Bois. Ann. Ent. Soc. Fr. 2, X, p. 301.

Black or blackish brown above ; all wings with median band of white spots ; apex of primaries fulvous. Fulvous spot at anal angle, sometimes with others, forming a band on hind wings. Beneath, costal and apical portion of fore wings fulvous ; white spot below costa within band ; band as above ; four subapical white spots ; row of submarginal lunules : hind wings bluish white on inner and anal margin ; band as above ; two rows of submarginal lunules ; black row within these ; then within fulvous ; basal portion fulvous with several light spots. Pacific Coast. Expands $2\frac{1}{2}$ to 3 inches.

Notes on some Sesiidæ

By Geo. D. Hulst.

Bembecia Marginata. Harr. August 26th 1881, I was in a little field grown up in briars near my home in Brooklyn, when I noticed what at first seemed to be a common yellow hornet. Having some suspicion, I caught it, and found it to be a female *marginata*, an insect which a year before, (it being then unknown to Mr. Hy. Edwards and the Brooklyn Lepidopterists), I had called *Sesia flavipes*. Between the above capture and Sept. 19th, when I took the last, I captured altogether about 75 males and 60 females and made the following observations. The moths emerge from pupæ during the early part of the day and climbing up the plants near at hand generally lie exposed to the sunshine on the upper surface of leaves. The males begin to fly from 2 to 4 o'clock in the afternoon, seeking for the females which remain at rest. The males fly with very great rapidity up and down the paths among the briars, resembling the most rapidly moving flies in flight. They are strongly attracted by the females; I found a virgin female, and was able to capture in one afternoon 27 males attracted to her. The sexes remain in coitu over night, or at least till late in the evening. With the early sunshine the female begins her flight for the purpose of laying her eggs. These are always in my observation laid on the standing blackberry both wild and cultivated. The female flies slowly, is not easily disturbed in flight, and is without difficulty taken in a cyanide bottle. In laying her eggs, she alights on the upper surface of a blackberry leaf, old or young, high or low, indiscriminately, — for a moment, stands fluttering her wings and so stands on tip toe — then moving sideways and bending her abdomen around the edge of the leaf she deposits a single egg beneath, then flies on, as a rule only a yard or two, then lights again. I saw the female often light on the leaves of other plants, but she immediately left them without laying. They are very rarely seen at their work after 10 o'clock. The males are quiet during the morning, resting on the top of the leaves, and on being disturbed fall to the ground simulating death.

Both male and female remarkably resemble certain hornets, and make a dull humming sound in flight.

The egg of the moth is perfectly oval in shape, and smooth under a high magnifying power. I kept eggs under ordinary conditions, but they had not hatched by mid winter, when a sweeping, (the bane of all well ordered students), swept them into the fire. In the field, none so far as I could see of many examined, were hatched when the leaves fell

in late autumn. I was not able to find the larva or pupa and though I examined scores of blackberry canes, both old and young, was not able to find one burrowed. And though nearly every leaf had one or more eggs under it, I was able to discover no diminution of healthy canes the next summer. My idea was that the eggs fall with the leaves in Autumn, hatch in the spring, attack the new growing canes, and the larvae live very near or below the surface of the ground.

Last year in the same field I took only two specimens.

Prof. C. V. Riley of Washington D. C., in the 6th report of Insects of Missouri pp. 111—113, which he has kindly sent me, gives from reports received from correspondents and personal observation, a history of what Mr. Hy. Edwards has determined to be this same insect. He gives a description of the larva as well as the imago under the name *Trochilium rubi*. The observations of his correspondents do not agree with my own. Mr. Wm. Saunders of London Ont. writes that the egg is laid upon the cane, on a space between two girdlings made by the jaws of the insects. This girdling is certainly an anomaly, if not as well an impossibility among the Lepidoptera. Harris says "the eggs are laid singly on the stem near a leaf or small twig." I saw the female oviposit certainly over a hundred times, and never saw her lay her egg, or attempt to lay it, any where but on a leaf. Several correspondents also write Prof. Riley their canes were largely destroyed by the larva which was partially grown when winter set in. In the case of hundreds of eggs in the field, and laid by impregnated females in confinement, I never knew one to hatch before winter; all outside fell to the ground with the leaves. I sought with the most patient care for canes showing signs of being burrowed but never found one; some cases where I found a virgin female I examined every cane within a yard of the place. Of course I must have missed my object however. The differences I do not pretend to reconcile.

There is much variation in the size and color of the specimens as well as in the sexes. The males vary from 7 to 13 lines, the females from 12 to 17 lines in expanse. Some have very much more yellow on the thorax and abdomen than others, the females on the average having the most. Some of these latter have the last three segments entirely yellow. The type of *flavipes* is one of these, and strongly differs from the typical *marginata*. I also secured a variety where the yellow of *marginata* is replaced by almost clear white. The markings are also not so heavy, and are obsolete on the anterior segments of the abdomen and nearly so on the thorax. The wings lack the russet shading, and on the coxae and femora white takes the place of the yellow of *marginata*. Mr. Hy. Edwards

told me he would without anything but the imagines to go by, look up on it as a clearly distinct species; but a male came to a virgin female *marginata* in confinement and I feel certain it must be a variety only. This variety I would call *Bembecia Albicoma*. Of it I took 2 ♂♂ and 1 ♀, in Brooklyn, N. Y.

Sesia acerni, Clem. This moth though quite common in many places is not often taken by collectors as it has generally flown before it is looked for. In the most of cases it emerges soon after sunrise in the morning and flies as soon as the wings are expanded and dried which takes but a few minutes after emerging from the pupa. A curious fact is that this moth flies by night as I have had in the evening several attracted into my room by the light. I have never after long continued observation seen the sexes mated or the female laying its eggs, and am very strongly of the opinion that these things take place during the night.

Mellitia cucurbitae, Harr. This moth appears on Long Island shortly after July 1st. During the summer of 1882 I captured some 30 specimens about a small bed of summer squashes in a neighbor's garden.

The moths fly during the day being most active during the hottest sunshine and quiet in the early morning. I have seen only two pairs mated and this was between 2 and 3 P.M. The female lays her eggs morning and afternoon mostly on the stalk of the plant just below the ground. She extends her abdomen in the crack of the ground about the stem of the plant and the most of the eggs I have seen were from $\frac{1}{4}$ to $\frac{1}{2}$ an inch below the surface. Often however they were laid a foot above the ground, and in a few instances were observed upon the petioles of the leaves. The egg is oval and of a dull red color.

In comparing my specimens I find, as with other *Sesiidae*, a considerable variation in appearance. The ordinary orange color is more marked in the female than in the male. One female had the body almost wholly black. In some specimens yellow takes the place of orange, and in one fresh male the abdomen is almost white and the fringes of the legs, ordinarily orange, are a very light yellow.

I also observed the insect feeding upon the flowers of the cultivated onion.

The larva is very destructive to the early summer squashes. The eggs hatch and the larvæ attack just as the first of the fruit approaches maturity. And in this city and the country immediately about, the plants almost without exception, in August suddenly wither and die. The later marrow and Hubbard squashes escape, but these are planted late for the fall and winter market, and the plants are hardly out of the ground by the time of the appearance of the insects.

Hints for raising coleopterous Larvæ.

By F. G. Schaupp.

I never had a book with an explanatory guide of how to raise coleopterous larvæ and I think that is just the fundamental necessity. By using his own judgement one will lose lots of fine larvae before he gets the secret. In the following lines I shall communicate my experiences in a somewhat systematic manner and I invite all those who work in the same field to publish in our Bulletin their results.

Commonly I took empty tomato- or fruit-tinboxes, have the upper margin cut smooth and covered by fine wire-screen, fastened by a cord or tin-ring.

Cicindelæ. *Only one larvæ can be raised in one box*, as they crawl out at night-time and attack each other. Fill the box half with moist ground; press it oblique, make a small hole with the tip of a pen-holder and the larva will in two minutes have taken possession of the hole for its residence.

Feed daily once with decapitated woodboring larvæ,* fleshy caterpillars, flies, veal, beef etc. but *be very careful to remove the remnants* or the fungus arising from the decaying matter, which is extremely noxious to the larvae will kill them in a few days. Moisten the earth twice or only once a week, according to the moisture of the air, but be very careful not to make earth too wet, for this would favour the growth of lice also very dangerous to larvæ.

Cover the box with tin cloth and place it into a dark closet or large box, for else the small flies or ichneumons will become fatal. Larvæ are found on the roadside, but more commonly on sloping banks at a little distance from the place where the imagines fly around, as I did describe more fully Bull. vol. II, 23. The larvæ will remain feeding during four to five weeks and the pupæ require for their development about ten days.

Classification of the Coleoptera of North America.

Prepared for the Smithsonian Institution by J. L. Leconte and George H. Horn, Washington 1883. — We just received the new classification and express in the name of the Coleopterists of the U. S. our sincerest thanks to the authors. It would be carrying water into the ocean to speak a word of the excellency of this work, indispensable to every collector, the names Leconte and Horn speak for it.

The book is printed on fine paper, adorned with excellent woodcuts, has about 600 pages with an appendage by S. Henshaw containing a list of synoptic papers and is for sale by the Smithsonian Institution in Washington.

F. G. S.

* Often the woodborers won the victory over the Cicindelidae therefore they have to be beheaded.

Editors Department.

(In this department will be brought short notes from all sources, extracts from correspondence, hints, queries, criticisms and the like, and any facts of interest that our subscribers or correspondents may send to us will find a place here. Editors.)

Preserving Duplicates. One of the difficulties a collector of coleoptera has to contend with when he makes large collections is to provide room for all his duplicates and still have them convenient and perfect when he wants them. Pinning them takes time, labor and pins; retaining them dry unset makes a breakage almost certain before the insects can be pinned and they require very careful handling: keeping them in alcohol mixes them up so much that they cannot be conveniently gotten at and when they are removed they harden rapidly.

A *modus* open to none of these objections and which we have thoroughly tested and used for two years is to preserve them by soaking them for a week or more in a fluid prepared as follows:

Dissolve 100 grammes alum, 25 g. common salt, 12 g. salpetre, 60 g. potash and 10 g. arsenious acid in 3000 g. boiling water. Filter the solution and when cooled add in the proportion of 10 litres of the fluid, 4 litres glycerine and one litre methyl-alcohol. At the end of that time the insects may be taken out and dried in the air: the fluid evaporates very slowly and it takes several days before it has all disappeared, but when it has evaporated your beetle remains soft and flexible for years, can be handled without danger of breakage and pinned when desired, sent unset all over the world and can be used when it reaches your correspondent either as a cabinet specimen or for dissection.

Should the beetles loose in appearance, become dirty, or it be desired to harden them, a benzine bath will clean them and will remove all trace of the fluid and the beetle will become hardened. Our own collections of duplicates are all preserved in this way, the species being kept in small, tight pasteboard boxes, easily excluding *Anthrenus*, ready for reference at all time and compact; many thousand specimens being kept in the same drawer.

J. B. S.

Book Notice. For the benefit of those who desire to know of all the new species published we would call attention to a paper on "*The Moths of New Mexico*" by A. R. Grote M. A., which recently appeared in a London periodical, the *Annals & Magazine of Natural History* (January 1883 pp. 49-58). It contains a list of New Mexican species collected by Prof. Snow. Quite a number of new species are described and one new genus, *Copimamestra* based on the European *Mamestra brassicae* and a new species, *occidentalis*. Apropos of this genus we recollect reading only a few days ago in Herrich-Schaeffer about as follows — "it would be just as unwarranted and nonsensical to create a new genus for *brassicae* because forsooth it has a *claw* at the end of the tibia".

We would also call attention to the fact that so good an authority as Lederer did not consider *brassicae* as distinct from *Mamestra*. The proof of course could not be read by the author and as a necessary result such errors as *Sparagmeia* for *Sparagmeia* occur.

J. B. S.

SYNOPTIC TABLES OF COLEOPTERA.

STENOLOPHUS, *Dej.*

For the generic characters we refer our Readers to Horn's paper "*On the genera of Carabidae*." Trans. Am. Ent. Soc. IX, 183.

The synopsis of the species is after Leconte's Synoptic Table, Proc. Ac. Phila. 1868, pp. 376—379.

Body stout, thorax but little narrower than elytra, front and middle tarsi ♂ broadly dilated, scutellar stria long.

Sides of thorax broadly flattened, scarcely reflexed; black, not very shining, first joint of antennæ, tibiae and tarsi brownish. **1. carbonarius.**

Sides of thorax less broadly flattened, more strongly reflexed; piceous black, shining, base of antennæ, margin of thorax, epipleuræ and legs brown, basal impression of thorax feebly and sparsely punctured. **2. spretus.**

Sides of thorax narrowly margined, margin not reflexed.

Labial palpi of ♂ fusiform.

Piceous with brassy lustre, margin of thorax and elytra testaceous, base of antennæ and legs more or less brown, thorax sub-quadrate, basal angles nearly rectangular, rounded at tip, impressions finely punctured and rugose.

3. limbalis.

Labial palpi of ♂ flattened or impressed beneath.

Legs and base of antennæ testaceous or brown, basal impressions of thorax with a few scattered punctures. Black shining, elytra piceous or testaceous, slightly iridescent; thorax feebly narrowed behind, hind angles obtuse rounded, bead of lateral margin pale. **4. fuliginosus.**

Legs and base of antennæ ferruginous, basal impressions of thorax rounded not punctured.

Black shining, elytra slightly iridescent, margin brown; thorax with the lateral bead brown, feebly narrowed behind, hind angles much rounded, basal impression, rounded, impunctured. **5. plebejus.**

Piceous shining, sides of elytra and disc of thorax frequently ferruginous, thorax feebly narrowed behind, hind angles not at all apparent. **6. conjunctus.**

Body more slender, thorax evidently narrower than the elytra, front tarsi of ♂ moderately dilated, fourth joint deeply bi-lobed, elytra with long scutellar stria, more or less iridescent, base of antennæ and feet pale, hind angles of thorax obtuse rounded.

Elytra more finely striate, middle tarsi of ♂ with two rows of squamiform papillæ.

Striæ deeper towards the tip.

Blackish with the margins paler, thorax wider than long, scarcely narrowed behind, basal impressions broad, very feebly punctured. **7. anceps.**

Elytra black with narrow pale margin, thorax scarcely wider than long, narrowed behind, basal impressions faint, feebly punctured, disc yellow with a large somewhat bi-lobed black spot (elytral striæ deeper than in the preceding and the next species). **8. cincticollis.**

- Striæ not deeper towards the tip. Beneath and head blackish; elytra, thorax, antennæ and legs testaceous; thorax wider than long, narrowed behind, basal impressions narrow not punctured, elytra with faint dusky cloud behind the middle. **9. unicolor.**
- Elytra more deeply striate, striæ deeper towards the tip, middle tarsi of ♂ without rows of squamiform papillæ.
- Larger, blackish with the margins paler, thorax wider than long, with the basal impressions broad, finely punctured. **10. flavipes.**
- Smaller blackish, narrow margins paler, thorax scarcely wider than long, basal impressions broad, sparsely but less finely punctured **11. ochropezus.**
- Thorax testaceous, hind angles more rounded, basal impressions sparsely punctured; elytra iridescent black with very wide testaceous side margin. **12 dissimilis.**
- Body elongate and linear, head as wide and nearly as long as the thorax, front tarsi of ♂ moderately dilated, middle tarsi slightly dilated, thorax narrowed behind with flattened rectangular angles; elytra with long scutellar stria; palpi longer and more pointed than in the other groups of *Philodes*, Lec.
- Elytra each with three distinct rows of dorsal punctures. Testaceous, head and part of elytra dusky; basal impressions of thorax large, deep, not punctured, body depressed, eyes small. **13. alternans.**
- Elytra with the rows of dorsal punctures obsolete, only the posterior puncture of the 2d stria obvious. Dark brown, thorax paler, with basal impressions less deep, but also not punctured. Body less depressed; eyes larger and more prominent. **14. tener.**
- Species 4, 5, 6, 7, 10 have the labial palpi ♂ flattened or impressed beneath, the remainder have them fusiform.

Bibliography.

1. *carbonarius* Dej. Sp. IV, 398. Middle and Southern States.—7.5 mm.
2. *spretus* Dej. Spec. V, 845. Fla. Ga.—6.5 mm.
3. *limbalis* Lec., Pacific R. R. Survey, 47 par. IX, 1857, App. I, p. 28. *indistinctus*, Mots., Bull. Mosc. 1859, II, 134, Cal. Or.—6.5-7 mm.
4. *fuliginosus* Dej. Spec. IV, 423. *versicolor* Kirby, Faun. Am. Bor. IV, 46. *fuscipennis* Lec. Ann. Lyc. IV, 410. N. Y.—7-7.5 mm.
5. *plebejus*, Dej. Spec. IV, 424. var. *immat fuscatus*, Dej. ibid. 426. N.Y., N.J. 5.5 mm.
6. *conjunctus* Say, (Trechus)-Trans. Am. Philos. II, 90, *misellus* Dej. Spec. IV, 467. *rotundicollis*, Hald. Proc. Ac. Phila. I, 302; *lugubris*, Hald. ibid., *rotundatus*, Lec. New Spec. Col. I, 17. From the Atlantic to the Pacific.—3.5-4.5 mm.
7. *anceps*, Lec, Pacif. R.R. Survey, 47 par. IX, 1857. App. I, p. 28. *rotundicollis*, Mots., Bull. Mosc. 1859, II, 135. Cal. Or. Nev.—5.5-6 mm.
8. *cincticollis*, Lec. Proc. Ac. Phila. 1858, p. 60. On the Colorado near the Gila. 6.5 mm.
9. *unicolor*, Dej. Spec. IV, 411. Pacific States.—4.5-5.27 mm.
10. *flavipes*, Lec. Proc. Acad. Phila. 1858, p. 60. Cal. Or.—8.5 mm.

11. *ochropezus*, Say. Trans. Am. Philos. II, 54. Dej. Spec. IV, 424 *convexicollis*, Lec. Ann. Lyc. IV, 404. N.Y., Atlantic Region.—5.5–6 mm.
12. *dissimilis*, Dej. Spec. IV, 424. La.—5.5–7 mm.
13. *alternans*, Trans. Am. Philos. X, 386. (*Badister*) *testaceus*, || Lec. Proc. Ac. Phil. II, 52. *Aepus test.* Lec. Ann. Lyc. IV, 413. *Philodes ult.* Lec. Class. Col. I, 33. Pa.—4.25 mm.
14. *tener*, Lec. Pacif. R.R. Survey, 47 par. IX, 1857, App. 1, p. 29. *Philodes tener*, Lec. Class. Col. I, 33. Cal.—4.25 mm.

ACUPALPUS, Latr.

In this genus are contained those species included by Dr. Leconte in his division C. (Proc. Ac. Phil. 1868, p. 377 and 378.) See Horn's genera of Carabidæ, Trans. Am. Ent. Soc. IX, 182.

Elytra with but one dorsal puncture, as usual, on the second stria; hind angles of thorax obtuse, somewhat rounded, frontal suture more distinct than usual.

Head narrower than the thorax and almost as long, color scarcely brown, elytra darker, slightly iridescent, thorax trapezoidal, but little broader than long, narrowed behind, rounded on the sides only before the middle, basal impressions broad, feebly punctured; eyes not prominent..... 1. *hydropicus*.

Head more distinctly narrowed than the thorax with larger and more prominent eyes, more elongate and less convex than the preceding; color variable, but the head is always dark and the elytra iridescent..... 2. *curus*.

Elytra with several dorsal punctures, hind angles of thorax rectangular not rounded.

Elongate more depressed, head blackish, thorax pale with a large quadrate dusky spot, anterior transverse impressions deeply marked, basal impressions broad, rugosely punctured; elytra pale with a broad dorsal vitta divided by the suture and abbreviated at each end; dorsal punctures three..... 3. *flavilimbus*.

Smaller and less depressed; head blackish, thorax testaceous, basal impressions deeper, feebly punctured, elytra dusky with the suture margin and base testaceous, dorsal punctures three..... 4. *longulus*.

Still smaller, thorax as long as wide, with the sides still more subsinuate behind and the hind angles more prominent, basal impressions deep, punctured; color brown or blackish, paler at the margins; dorsal punctures four..... 5. *rectangulus*.

Bibliography.

1. *hydropicus*, Lec. New Spec. I, 17. Northern and Western States.—3 mm.
2. *curus*, Lec. ibid. p. 18. Can. Mich. Penn.—2.5–3 mm
3. *flavilimbus*, Lec. Proc. Ac. Phila. 1868, p. 378. Ga.—4 mm.
4. *longulus*, Dej. Spec. IV, 459. Ga.—3.5 mm.
5. *rectangulus*, Chd. Rev. et Mag. Zool. 1868. p. 18. S. C., Ga.—3–3.25.

PSEUDOMORPHA, Kirby.

Synopsis table. by Geo. H. Horn, M. D.,

Elytra distinctly narrower posteriorly.

Elytra with rows of coarse punctures forming nine quite regular striæ. Head and thorax reddish, elytra piceous **excrucians.**

Elytra nearly smooth, punctures obsolete, color entirely piceous. **Cronkhitei.**

Elytra parallel.

Elytra with moderate punctures irregular on the disc, forming striæ at the sides.

Behrensi.

Elytra with moderate punctures, confused on the disc, finer at the sides and forming striæ, in addition a row of large dorsal punctures, 9-10 in number near the suture..... **angustata.**

Bibliography.

P. excrucians, Kirby, Trans. Linn. Soc. 1825, p. 101, pl. 3, fig. 3. Ga. S. C.—6.5 m.

P. Cronkhitei, Horn. Trans. Am. Ent. Soc. 1867, p. 151, Owens Valley, Cal.—8mm.

P. Behrensi, Horn. Trans. Am. Ent. Soc. 1870. 76. San Joaquin Valley, Cal. 9.5mm.

P. angustata, Horn, n.sp. Ariz.—7.5 mm.

Hints for raising Coleopterous Larvæ.

(Continued from page 11.)

Carabidæ. The larvæ of Carabidæ may be placed in lower boxes with earth; the food is the same as mentioned under the Cicindelidæ.

They need small flat stones and moss for hiding; never use wood for it, as it will mould on the damp earth and kill the larvæ. Feed daily, and moisten the ground either twice or only once a week, according the moisture or dryness in the air, but be very careful not to make the earth too wet. The larvæ of Carabidæ are found partly in the same places with the imagines, under stones, chippings etc. near moist places, at the edges of wood, but they are rather rare with the exception of that of *Galerita janus*, which is found in numbers; sometimes they are in decaying wood, under the loose bark, but the greater part undoubtedly live in the earth, rarely appearing at the surface. *Pterostichus* larvæ are found under cow-droppings, quite common. Larvæ are also found in the earth near the banks of brooks and rivers.

A most important thing to be observed in raising larvae is this, all material brought into the box, as earth, moss, wood etc. has to be previously

treated with hot water or heat to destroy all living creatures that may be contained therein, for there may be either small *Staphylinidae* etc. destroying your larvæ, or there may be some other larva especially in the wood, which will develop while the one you confined in it after having made a drawing and description of it, will die and you may think the developed insect came from your larva.

It is somewhat more difficult to raise the larvæ from the imagines. The best plan is to take species found in copulation, and place them in cages and feed as in *Cicindelæ*.

Cages with wire screen to bottom will not answer the purpose, as the young larvae will crawl through; there must also be earth in the cage to protect the young larvæ against attacks from brothers and parents. A few days after copulation the males ought to be removed and a few days later the females also, and put into another cage as I think they kill their own children thus differing very much from dungbeetles and *Necrophori* which take great care of their offspring.

By using very black earth for the cages, the eggs and young larvæ may be more easily detected. As a matter of course as soon as the larvæ are a few days old, place each one in a smaller separate box and proceed as above.

Clusters of eggs found under stones, boards and leaves may be also taken home and placed in boxes.

Necrophorus and **Silpha** larvae are perhaps raised the easiest of all. Take a soap-box half filled with loose moist earth, place therein some poor meat and a dozen specimens of a species *Necrophorus* or of *Silpha* cover the box with fine wire screen and place it out of the way till the worst smell is over. Keep it in the dark to prevent flies from depositing their eggs thereon — after two weeks you will have plenty of larvæ shortly after plenty of pupæ and in two weeks later imagines, if some parasite, does not devour the pupæ before. On a single pupa I often found as many as ten very lively running parasites of considerable size, always hiding beneath the antennæ and legs of the pupæ. Inspect the pupæ frequently and discovering these parasites, take a very fine hair-brush, dip the point into benzine and touch the parasite, which becomes somewhat dizzy and is easily removed. Pupæ too much infested are put in Alcohol and kept as specimens for the biological collection.

In the case of *Necrophorus* you may keep any quantity of larvæ in the same box; they will live peacefully together provided they have enough to eat, which they do moderately; with the *Silpha* larva the case lies al-

together different, they are the most voracious creatures I ever saw; they eat so much that the skin bursts every second day; they also kill each other when in the same box although well provided with food.

Therefore having obtained larvæ of *Silpha* in the manner indicated above, separate them as early as possible, keeping each individual in a separate small box and feeding them with small pieces of fresh meat, as much as they may devour in one day. Feeding the following day, be careful to remove the remnants of the repast of the day before. Just as with negro children the larvæ of *Silpha* when very young and after each moult appear snowy-white, after an hour they are steel blue and after another hour genuine darkeys; jet black.

Woodboring larvae. For the greater part *Lamellicornia*, *Longicornia*, *Elateridae*, *Buprestidae*, *Curculionidae* — are easy to raise, but care has to be taken that only specimens of the same species are confined to one box.

It is necessary to give them larger boxes, so that large pieces of wood may be enclosed, but it is very difficult to observe the proceedings except with very large species. These may be treated as follows: Take a piece of wood 4 inches cubic, split it at middle and then make at the interior sides a cavity just large enough that the larvæ may easily move, then fasten the parts together with a strong rubber band. Moisten the wood in the box a little twice a week and if the larva escapes by boring a hole through the wood, replace it at the central cavity filling the borehole by a bung.

Some larvæ especially *Lamellicornia* and *Elateridae* before transformation enter into the earth. For such species place some earth in the box, but not before the larvæ show a decided wish to go there by boring very quickly holes straight downwards; for the earth in contact with the moist woods very quickly forms a deadly fungus.

As a matter of course the earth to be placed into the breeding boxes has to be previously treated by heat or boiling water to destroy all animal germ possibly destructive to the helpless soft-skinned pupæ. Larvæ and pupæ are kept in darkness.

For Bark and Bast loving larvae, i. e. such found under the bark of diseased trees, such as some *Buprestidae*, *Longicornia*, *Cucujus* etc. cut with saw and hatchet pieces of the infested tree with the bark about six inches square about 1 inch thick take some of the rubbish and sawdust and the larvae and when at home place them under the bark. Several

pieces of bark with the bast-sides together will sometimes do also, but the best plan with these larvæ is to leave them in the wood till they are nearly full-grown; then the whole transformation takes place in two weeks.

Larvæ of dung-beetles are taken home with a part of the earth above which they live and part of nearly dried odorless cow-droppings under which they hide. But here the greatest care has to be taken not to overlook the very numerous small *Staphylinidae* and carabidous larvæ that live with — or rather on — those Scarabæidous larvæ.



On the Anatomy of the N. A. Noctuidæ. Part I. The Legs.

By John B. Smith.

Recent studies on the anatomy of the *Noctuidæ* begun while preparing my synopsis of the genera, have revealed to me peculiarities of structure, which while probably known to others seem never to have been noted in any publication. I have therefore made a study of each part of the *Noctuid* anatomy with the view of bringing together, and adding to, what is known of the subject, and the results of my observations I shall give in a series of papers of which this is the first.

The legs of the *Noctuidæ* as in the other *insecta* consist of:

The Coxæ or that part of the leg nearest to the body which varies in size and proportion in each pair of legs. The anterior are always largest, and have the greatest degree of mobility: this in the typical *Noctua* (*Agrotis*, *Hadena*) is exceedingly limited, but in the lower groups and especially the *Deltoidæ* becomes more extensive. The middle and posterior *coxæ* are practically immovable, and even in the lowest groups mobility seems only to be in one direction they are always much smaller than the anterior pair, and never become abnormally developed as do the latter.

The *trochanter* is situated between the coxa and femur and is the smallest and least prominent part of the leg and serves principally to give a greater range of mobility to it, and as the anterior legs are always most used, and best developed, it is in this pair that it can best be observed: its variations are exceedingly small and of no importance whatever to the systematist.

The *femur* is usually the heaviest and strongest part of the leg, and it has a very limited range of variation: usually the three pair are of nearly equal length rather heaviest at base, and slightly decreasing in size toward the tip. *Herminia* shows the widest departure from this form in one direction, the member becoming thin and a mere shell while *Dichonia* in Europe and *Pseu laglossa* in America marks the other extreme: the member being very heavy at base and suddenly and abruptly excavate near tip.

The member is never armed in any way so far as I have observed: the clothing varies occasionally in the sexes, but these differences are best noticed in speaking of the different genera.

The upper surface near the base is always grooved to receive the *coxa* — in the anterior most distinctly so, while the under side is more or less grooved to receive the tibia. Abnormally so in *Dichonia* and *Pseudaglossa*.

The *tibia* is the member that shows the widest range of variation, and is the part that has been hitherto most used by the systematist in separating *genera*. The anterior is always shortest, never equalling the femur in length and is never *spurred* as are the middle and posterior, but is often armed at tip with spines or claws — the under side has always an excavation varying in length and position, which is covered by a membranous, concavo convex lappet attached above, tapering to a point at tip, and ciliate at the sides: this is universally present throughout the noctuids and its variations are best noted when speaking of the various genera. Sexual modification, and abnormal developments are also best noticed in that connection.

The middle *tibiae* are usually about equal in length to the *femora*, generally heavier than the anterior, and always have a pair of terminal spurs at the inner side: these spurs are rarely of equal length — most nearly so in the first part of the family; while usually the inner one is longest; in some of the *Deltoids* the outer is less than $\frac{1}{2}$ the length of the inner. In the higher groups the spurs are covered nearly to the tip with scales, but the tip is bare and corneous. In the lower groups the clothing covers the tip and the spurs are more weak and membranous. It is seldom that the middle *tibiae* are sexually modified; never except in clothing, and this variation in clothing will be hereafter noticed.

The posterior *tibia* is always longest, always longer than the *femur* and often (in the *Deltoids*) disproportionately long. It always has two pairs of spurs, one near the middle or $\frac{1}{3}$ from tip, and another pair at tip. Where

there is any difference the upper pair is longest, and the inner spur always exceeds the outer in length.

Modifications of this member are still more rare and there are few that I know of except sexual modifications of clothing.

The *tibiae* or some pairs of them are often spinose: often all are so armed but most generally the middle and posterior pair only and when one pair only is spinose it is always the middle one that is thus modified.

In addition to this armature the anterior tibia has another, peculiar to it: this consists of claws or spines at tip, and to accommodate this armature the tibia is often greatly modified as will be explained hereafter.

The *tarsi* in the *Noctuids* are always five jointed, and always spined, though sometimes only feebly so, and in one instance to be hereafter specified obsoletely so.

The joints differ in length, the basal being always longest, and sometimes longer than the anterior tibia: sometimes they are peculiarly clothed in the ♂ but in no other respect have I noticed any noteworthy variation.

Terminating the tarsi is a pair of claws which vary greatly.

The claws are united to a short stalk, terminating in a ball to fit into a socket in the last tarsal joint.

The claws are sometimes simple more usually dentate sometimes bifid occasionally notched at tip or otherwise modified in modes to be hereinafter described.

Thus having gone over the parts of the leg generally we are ready to proceed to particulars.

Agrotis may be considered as the type *Noctua*: the tibia are in most instances all spinose; sometimes the anterior are not so. The tarsal claw is toothed.

The tip of the anterior tibia has always been said to be unarmed and in my synopsis of the genera *Agrotis* falls into a Section with the anterior tibia unarmed at tip: to a large proportion of the species this is applicable but *Agrotis Ypsilon* Rott., and some others have the anterior tibia very distinctly spinose, have a very long stout spine at the inner side, and a shorter at outer side of tip. Denuded of clothing and viewed through the microscope the tibia certainly can not be viewed as unarmed at tip. *Agrotis muraenula* G. and R. is if possible more distinctly armed, for the spines are not so numerous at the sides and the terminal spines are more prominently set.

A. Annexa Tr. is the most heavily armed of all the *Agrotids* I have examined: it has what may be almost termed a true claw at the inner

side of tip and two very heavy spines at outer side. Several others of the species have very distinctly armed fore tibia, but not so as to deserve special attention here. *Agrotis* is the first of the genera having armed tibia: the genera placed before it in the family are distinguished in so far as the legs are concerned in having them almost universally more compact, shorter, the spurs not so long, and on the posterior tibia closer together.

In those species of *Acronycta* that I have examined the tarsal claws are simple and without tooth or dent of any kind the spurs of tibiae are more equal, and in the ♂ the tibiae are clothed with longer silky hair. In *Pseudothyatira* the legs are much as in *Acronycta* except that the excavation of anterior tibia is very small, and the lappet correspondingly diminished in size; the tarsal claws are simple and the middle tibia in the ♂ has very dense brushes of hair on the outer side: the *femora* are in proportion less heavy than the tibia.

Habrosyna scripta Gosse. differs in the still more limited excavation of anterior tibia, and in having all *femora* and *tibia* in the ♂ clothed with dense long silky hair.

In *Mamestra* the tarsi are proportionately shorter, the claws terminating them are long slender very decidedly curved, with a feebly marked tooth near tip: some of the species have a spine or claw at tip of anterior tibia: one American form so distinguished has recently been described by Mr. Grote as *Copimamestra*.

Hadena does not differ, as far as I can make out except that the tarsal claw is more distinctly toothed.

Metahadena is an example of anterior tibia armed with a claw at tip; quite a number of genera are so armed as a reference to my synopsis will show and where there is only a single claw it is always inserted at the middle of the tip. The excavation of the fore tibia is very long and the lappet extends from near the base to the tip of tibia and is unusually broad.

Eriopus is peculiar in the clothing of the middle ♂ and posterior tibia and tarsi being adorned with long fluffy brushes of hair.

I have seen only one American specimen which showed this peculiarity in full perfection, and that was what I believe to be an undescribed species in the Mr. Edwards' collection.

Prodenia has the legs strong and compact, moderately hairy in the ♀ and very densely so in the ♂. The inner spur of the middle tibia is unusually long, the tarsi are short and the claws simple.

Hydroecia nictitans Bork, is peculiar by the tarsal claw which is like no other I have examined.

Phiprosopus, *Crambodes* and *Doryodes* resemble each other very closely in structure of the legs, and show a decided downward step. The anterior coxae much more mobile and much longer: the posterior tibiae become longer and the legs as a whole are too long for the slight insects. *Senta* and *Platysenta* lean that way, and I am a little at a loss to understand exactly how these last, and *Doryodes* fit in between *Macronuctua* and *Leucania*. I should place them lower in the scale.

Plusiodonta resembles the foregoing in leg structure in some respects: the coxa is larger than in the preceeding genera and more mobile: the anterior tibia is very decidedly excavated and the lappet small in proportion: the last mentioned genera all agree in this character. *Plusiodonta* is in all respects an aberrant genus and its affinities seem to point in all directions: most distinctly downward however and it would not be ill placed after, instead of before *Plusia*, and near to *Acontia*. The tarsal claw is unusually small in proportion to the insect and its shape broad and flat with a sudden hook like termination showing in this respect also a tendency downward, as shown by a comparison with the claw of *Herminia*.

The legs of *Leucania* are entirely unarmed but in some species densely hairy in the ♂.

Nephelodes is peculiar: the anterior femora are very slight and so decidedly excavate beneath, that only a shell remains: the tibia also is slight with the excavation well marked and the lappet extending from the base to the tip: the tarsi on the contrary are stout and very heavily spinose: the claws are simple.

Scopelosoma has the legs compact and well clothed with hair: the tarsal claws are simple.

Calocampa cineritia Grt. has the legs compact the tarsal claws very decidedly toothed, and the middle tibia with a slight excavation on the outer side: this I have not noticed elsewhere.

Nycterophaeta has the tip of the anterior tibia peculiarly modified; a flattened corneous projection terminates the tibia and is drawn out on each side making the appearance of two claws for which I at first mistook them.

Cucullia to which the foregoing is nearly related has the anterior tibia armed in some of the European species.

(TO BE CONTINUED.)

Editors Department.

(In this department will be brought short notes from all sources, extracts from correspondence, hints, queries, criticisms and the like, and any facts of interest that our subscribers or correspondents may send to us will find a place here.—Editors.)

Alypia octo maculata. In the small patch of ground allotted my residence as a yard is a grape vine, suffering annually from the caterpillars of this moth. Usually the moths appear in June and early in July, but this season, a specimen was found May 1st another on May 8th and several have been seen in the interval. They are not very active and are easily taken. The grape, the food plant of the caterpillar has yet (May 12) scarcely a leaf. I never before heard of the moth appearing thus early.

Check List. We have in preparation a list of additions and corrections to our "Check list" which will bring it to the date of publication of the addenda: will our friends please send in a memorandum of all omissions or errors they may have noted in the list as we desire to make it entirely complete and accurate.

Mounting Microscopic beetles and parts dissected during study. The habit of many has been after examining the parts of an insect and making dissections to throw away the insect after making notes. Others mount them in balsam on glass slides: this latter had been my practice, but slides accumulate and are inconvenient to keep. A substitute a knowledge of which I owe to Dr. Horn answers admirably for all purposes and is perfectly simple. A hole, round or square is punched or cut out of a piece of Bristol board of any desired size, a cover glass (I use the square) is fastened on one side over the aperture by a thin circle of shellac; this forms a shallow cell in which the part to be examined is placed, a drop of Canada balsam is put on it and the whole is covered by another cover glass. Your preparation thus effectually preserved, and you can put a pin through the end of the card and put it in your cabinet next the insect the object is intended to illustrate. You can put half a dozen cards on a single pin and the space thus occupied is very small while the preparation is as convenient for examination as though mounted on a glass slide.

To keep out Dermestes Mr. Ackhurst states that he has successfully used the following preparation; 3 parts cresote or crude carbolic acid and one part oil of penny royal. Apply at the seams, grooves and edges of the boxes or where there is a chance for entrance, and neither *Dermestes* the small paper lice, nor the ants will trouble you. Against the two latter pests I have found the carbolic acid alone to be sufficient.

To wash old dirty specimens there are many ways but the one that seems to us the best is the following.

Place the specimens in a tin-kettle $\frac{3}{4}$ filled with moist sand, to soften them; small species remain therein over night, larger for 24 hours, then wash them with cold water, using a small stiff paint-brush, if not sufficiently clean, apply soap; rubbing with the brush and then wash them with cold water. On *Trox*, *Lachnosterna* and other species covered with a layer of mud on the wings the soap is left for a few hours, and then washed off with cold water again.

Greasy specimens are put in benzine but great care has to be taken that they are not left too long in this fluid, as they thereby become very brittle.

SYNOPSIS OF BUTTERFLIES.

ERESIA, *Doub.*

This genus closely resembles *Phyciodes* and *Melitaea* and the species have been generally described as *Melitaea*. Mr. Strecker includes them all in that genus and Mr. Kirby in his catalogue makes them all *Phyciodes*: for the nonce we follow Mr. W. H. Edwards. Differs from either of those genera by the narrower wings rounded apices of primaries, and excavate outer margin of same wings: the secondaries are dentate. They are all southern and generally more common in Mexico, Cuba and South America.

The species are distinguished as follows:

Above fulvous with black markings and spots similar to *Phyciodes tharos*.

Beneath resembling same species..... *frisiana*.

Above fuscous with yellow spots and short bands at outer half of primaries; Secondaries with a submarginal row of crescents, a streak, and a median band all yellow..... *punctata*.

Above black, base of both wings indistinctly fuscous with black markings:

Primaries with three interrupted bent rows of white spots; secondaries with a submarginal row of white crescents and a complete band of white spots on disc..... *texana*.

E. frisiana, Poey., Cent. Lep. Cuba, p. 9 t. 2 (*Melitaea*) Reak. Pr. Ent. Soc. Phil. V, 226 (*Eresia*).

This species most nearly resembles *Phyciodes tharos* while perfectly and evidently distinct from it. The black is more confluent, and the fulvous is not equally intense in shade. The ♂ of this species is figured in *Hew. Ex. Butt. III, t. 6. f. 45, 46*, and is smaller and somewhat darker than the ♀.

Expands 1 to 1.5 inches. *Hab.* Florida Keys, Cuba.

E. punctata, W. H. Edw. Tr. Am. Ent. Soc. III, 191.

Five yellow spots near apex of primaries, and a bent bar of the same color crossing the cell: on secondaries the median band narrows posteriorly. Beneath, primaries fulvous at base, fuliginous on disc and gray sprinkled with ferruginous near hind margin. Markings of upper side reproduced on both wings.

Expands 1 to 2 inches. *Hab.* Arizona, New Mexico.

E. texana, W. H. Edw. Proc. Ent. Soc. Phil. II, 81; *cincta* W. H. Edw. Pr. Ent. Soc. Phil. II, 502.

The wings have a submarginal row of white crescents more or less indistinct on primaries; on the latter are an interior row of round spots of which the costal third, and marginal spots are largest, three spots terminating the discal cell, one near middle of wing and a row of three small spots at basal third. Beneath, primaries fulvous at base, fuscous at outer half, apex and margin paler: the white spots are reproduced. Secondaries pale at base and apex, fuscous toward outer margin: marked as above.

Expands 1.5 inches. *Hab.* Tex., La., Fla., and Mexico.

Mr. Strecker catalogues in addition *E. hermes* Hew. Ex. But. III, Eres. t. 5, f. 32: Mr. Scudder in Buff. Bull. II, 268, recognized the same species as belonging to our fauna, but Mr. Edwards omits it from his catalogue as not sufficiently authenticated. Mr. Reakirt redescribed it as *E. genigueh* from Los Angeles Cal. It is entirely unknown to us.

SYNCHLOE, Bd.

The species of this genus closely resemble some of the *Melitæa* and *Phyciodes*. The wings are elongate, the apices produced and rounded, and the outer margin oblique and very nearly straight. As in the preceding the species belong to the South and South-west, and are not common. The order of the species in the synopsis seems to us the most accurate for cabinet arrangement.

They are distinguished as follows.

Wings above fuscous or fuliginous.

A wide fulvous band, a submarginal and an interior row of white spots crossing both wings.....**adjutrix.**

A narrow flexuous and broken fascia on primaries and a broad subangulate fascia on secondaries brick red.....**mediatrix.**

Wings above black; primaries spotted with white.

Secondaries above with the centre carmine.....**janais.**

Secondaries above with a subbasal yellow patch divided by black nervures: a large bright red spot near anal angle.....**erodyle.**

Secondaries above with a narrow white band crossing the middle of wing.....**crocale.**

S. adjutrix, Scud. Buff. Bull. II, 269 (*Chlosyne*); *Lacinia*, W. H. Edw. "Synopsis" p. 18, (*Synchloe*).

The insect bears a strong superficial resemblance to some forms of *Phyciodes nycteis*. Beneath, the markings of the upper side are reproduced, exaggerated, and paler yellow.

Expands ♂ 1, ♀ 1.5 to 2 inches. *Hab.* Texas.

S. mediatrix. Feld Reise Nov. II, 395. *Saundersii* W. H. Edw. "Synopsis" p. 18.

The fringes are marked with white, and the primaries have two marginal spots and two spots in the cell, also white. The secondaries have three brick red spots near base, and near outer margin a number of white spots, sometimes more or less confluent and occasionally entirely wanting.

Expands 1.5 inches. *Hab.* Texas, Bogota, (from this latter place it was described).

S. janais, Dru. 3, 24, Pl. 17, f. 546 (*Nymphalis*). Doub. and Hew. Gen. Diurn. Lep. 1, 186 (*Synchlœ*).

A distinctly marked species. Primaries with two flexuous rows of white spots and three white spots in cell. Secondaries with an indistinct row of small white spots beyond the red patch. Beneath, markings of primaries reproduced. Secondaries black at base and outer third; nearest base is a yellow space followed outwardly by an incomplete broad red band. There is a marginal row of yellow spots and an inner row of small white points.

Expands 2.5 to 3 inches. *Hab.* Texas, Mexico, Central and South America.

S. erodyle. Bates. Ent. Mo. Mag. 1, 84.

Primaries with seven white spots of various sizes arranged in a rude circle on disc, and a curved row of six similar but more uniform spots between them and outer margin. Beneath markings reproduced and in addition on primaries is a vermilion streak at base; secondaries with an interrupted submarginal row of large vermilion spots.

Expands 2 inches. *Hab.* Texas, Central and South America.

S. crocale, W. H. Edw. Tr. Am. Ent. Soc. V, 17.

Primaries three rows of white spots of which the inner row is larger and most distinct. Secondaries with a row of very small and indistinct white spots between median band and outer margin; a fulvous anal spot. Beneath, markings reproduced and in addition the secondaries have a yellowish band near base, and a marginal row of large crescents.

Expands 2 inches. *Hab.* Arizona.

CYSTINEURA, *Bd.*

The only American species of this genus is readily recognized by its color. The genus differs in the elongate primaries with produced pointed apices and very oblique slightly convex or rounded outer margin. Secondaries triangular and comparatively somewhat small. Antennæ rather short with a cylindric club, showing an evident relationship to the *Satyrinae* to which indeed it is very close, as the costal vein of the primaries is inflated. The position assigned the genus by Mr. W. H. Edwards between *Phyciodes* and *Vanessa* is unnatural. The species is:

C. dorcas, Fab. Syst. Ent. 508 (*Papilio*); *anymone*, Men, En. An. Mus. Petr. Lep. I, p. 123, t. 9.

Above white: primaries with base, costa, apex and outer margin dusted with ash gray, the outer margin with a fulvous tint. Secondaries gray at base, terminal space yellow, margin narrowly black. Beneath primaries with markings of upper side reproduced, except that the grey is replaced by yellow: Secondaries yellow, with a complete white band near base, and an interrupted band of white spots at outer third.

Expands 1.5 inches. *Hab.* Texas, Central America.

ANARTIA, *Doub.*

Head small scaly; eyes round somewhat prominent; tongue very long; antennæ long, club short compressed, pointed. Primaries with apices rounded, external and internal margins of primaries sub-emarginate, external margin of secondaries sinuous and dentate. Anterior feet of the ♂ small, weak; of ♀ strong. Abdomen thin and short.

There is but a single species found in the U. S.

A. jatrophae; L., Syst. Nat. II, 779 (*Papilio*) Cram. Pap. pl. 202, Herbst tab. 172.

Above, dull livid with brownish transverse undulated lines, and three black ocellate spots, one on primaries near internal angle and two on secondaries. Beneath paler, ocellate spots reproduced and with a white pupil. Antennæ black, club ferruginous.

Some specimens have the extremity of the wings russety and a double row of lunules of this color.

Hab. Texas, Florida (in U. S.).

List of Carabidae found in the neighborhood of New York City.

By F. G. Schaupp.

Carabinae.

Omophron americanum Dej. June–Sept. In Greenville N. J. on the muddy or sandy banks of a small brook, hidden in the grassbunches also with the two following species at Coney Island and Rockaway.

Omophron tessellatum Say. and *O. labiatum* Fab. May–October. At Coney Island and Rockaway Beach near ditches and small ponds in company with each other.

Cychrus stenostomus Weber, var. *Lecontei* Dej. May & June, at the foot of the Pallisades, in wet places in company with snails. Not rare. Sometimes found in numbers. Also on Staten Island. Under stones.

Cychrus elevatus, Fab. June, Sept. Near Ridgewood and in Jamaica wood, also on Staten Island, in woods under stones and under the bark of stumps. Rare.

Carabus sylvosus Say. (the narrower form) June. In woods near water under stones. Near Ridgewood, Greenville. Rare.

C. serratus Say, June to Sept. Behind Hoboken on Pallisades under stones. Rare.

C. limbatus Say. May to Sept. Greenville, Jamaica woods, Bay Ridge under stones. Not rare.

C. vinctus Web. May to Sept. Pennybridge, East New York, Bay Ridge, Staten Island under stones. Not rare.

Calosoma externum Say. Very rare June to Sept., near water under stones, at same places as *Carabus sylvosus*.

Calosoma scrutator Fab. All summer. Under stones, but also very often on trees, on one wild-cherry-tree I once captured five specimens at once. Found also often washed to the Coney Island shore. Not rare.

Calosoma Willcoxi Lec. Only two specimens captured in the city in rooms. May, June.

C. Sayi Dej. May. Tollgate, near South Side RR. Rare.

C. calidum Fab. May to October. Every-where under stones, often in numbers. Common.

Elaphrus ruscarius Say, June, July. Greenville, N. Y. on moist spots in the woods, on the mudflats behind Hoboken; near the Myrtle Ave. Park, etc. Running and flying quickly during sunshine, but in cool and cloudy weather sluggish. Common.

Notiophilus aeneus, Hb. & *Hurdyi* Putz., June to Sept. also *sibiricus* in woods hidden among damp leaves or during sunshine running around and glittering among the dark leaves.*

Nebria pallipes, Say., June to Sept. Fort Lee and Orange Mts. also Staten Island in nearly dried out little brooks or ditches and under stones, especially at both sides of the ditches. Always numerous.

Pasimachus sublaevis, Bon. June. Under boards or cow-droppings on the sand in Coney Island.

Scarites subterraneus, Fab. The whole years under stones etc.

Dyschirius sphaeriolis, Say., and *erythrocerus*, Lec. May to Sept. in the sand of the banks of rivers, brooks, ponds; also, in marshy meadows.*

sellatus, Lec., *filiformis*, Lec. June, Sept. In the sand near ditches and pools on Coney Island.

globulosus, Say., July. On moist places in the woods, rare.

Ardistomis viridis, Say., June. Clifton N. J., Rockaway. In sandy banks.

Clivina americana, Dej., June. With *Dyschirius sphaeriolis* same time and same localities.

Schizogenius lineolatus, Say., June, Sept. Under small stones on the sandy banks of the Passaic River; N. J.

Harpalinae.]

Panagaeus crucigerus, Say., and *P. fasciatus*, Say., May, June. Under stones on Snake Hill, N. J., and in Cypresshill-Cemetery, rare.

Bembidium punctatostriatum, Say.; *inaequale*, Say.; *nitidulum*, Dej.; *americanum*, Dej.; *antiquum*, Dej.; *chalconum*, Dej.; *nigrum*, Say.; *platinum*, Hald.; *patrule*, Dej.; *variiegatum*, Say.; *versicolor*, Lec.; *semistriatum*, Hald. May to Sept. Near the banks of the Passaic River in the sand.

B. 4 maculatum, Linn. May to Sept. in woods and fields under stones everywhere.

B. constrictum, Lec.; *lacunarium*, Zimm.; *variiegatum* var *posticum*, *rapidum*, Lec. (var. of *intermedium*, Kirby). June, July. On Coney Island and Rockaway.

Tachys proximus, Lec.; *scitulus*, Lec.; *nanus*, Gyll.; *tripunctatus*,

* All the species hidden in the sand or the grass on the banks of rivers etc., are driven out of their retreats by pouring water over the spot. See Bulletin vol. I, p. 11.

Say. ; *incurvus*, Say. May to Sept. Near the banks of the Passaic River in the sand.

Patrobus *longicornis* Say., May to Sept. In the woods in moist places. Very common.

Myas *cyanescens*, Dej., June, July. Fort Lee and Clifton N. J.

Pterostichus *adoxus*, Say. ; *rostratus* Newm. ; *diligendus*, Chd. ; *lonestus*, Say. (in the woods under stones, rare ; *lachrymosus*, Newm. ; *stygicus*, Say. ; *moustus*, Say. ; *Sayi*, Brull. ; *lucublandus*, Say. ; *lutosus* Dej. ; *corvinus*, Dej. ; *mutus*, Say. ; *erythropus*, Dej. ; *patruelis*, Dej. June to Sept. In the woods and fields under stones, stumps etc.

corruseculus, Lec. Under moss on Long Island, rare.

strenuus, Lec. (*Lophoglossus*) at the banks of a pond on Long Island, April, May.

Amara *avida*, Say. ; *angustata*, Say. ; *impuncticollis*, Say. ; *interstitialis*, Dej. ; *obesa*, Say. ; *chalcea*, Dej. ; *musculus*, Say. May to Nov. under stones every-where, *angustata* also often on flowers and grass in July, *musculus* on Coney Island.

Diplochila *laticollis*. Lec. May, June, at the foot of the Pallisades behind Hoboken, common, under stones near water.

Dicaelus *dilatatus*, Say. June to Sept. Fort Lee and Clifton under stones in the wood, not rare.

purpuratus, Bon., Clifton, N. J. June, July, under stones in the woods, rare.

elongatus, Dej. ; *tetr*, Bon. *politus*, Dej., June, Sept. In the woods on the Pallisades.

Badister *notatus*, Hald. June. On Staten Island, rare.

Calathus *gregarius*, Say., May to Sept. Every where common. *impunctatus*, Say., June, Fort Lee, rare.

Platynus, Bon. During the whole season on moist places in the woods under stones, and rubbish ; *angustatus* Dej. Hoboken Fort Lee, *decens*, Say., *sinuatus*, Dej. every where, *opaculus* Lec. quite rare. *cincticollis*, Say, and *reflexus*, Lec. found in and near a small half-dried up brook near Fort Lee Landing.

extensicollis, Say, near brooks Clifton N. J. Weehawken.

decorus, Say. In woods, common.

tenuis, Lec. Long Island in woods, rare.

melanarius, Dej. ; *affinis*, Kirby ; *metallesens*, Lec. In woods.

cupripennis, Say. In the fields everywhere.

excubatus, Dej. ; *ferreus*, Hald. : *nulans*, Say., (rare) ; *octopunctatus*, Fab. ;

placidus, Say. ; *obsoletus*, Say. with *sinuatus*.

aeruginosus, Dej. Under the bark of fenceposts, on fruit-trees, easily captured by placing a few leaves in the fork of the trees over night, the following morning this species is found with many of other families.

crenistriatus, Lec., *sordens*, Kirby, *ruficornis*, Lec. *rubripes*, Zimm., *punctiformis*, Say., *lululentus*, Lec. with *sinuatus*.

Olisthopus *parvatus*, Say. June. Long Island formerly not rare, but lately extremely scarce.

Atranius *pubescens*, Say. June. Hoboken foot of Pallisades, rare.

Leptotrachelus *dorsalis*, Fab. I have but two specimens one from Long Island the other from N. J., without exact date or locality.

Casnonia *pennsylvanica*, Lin. May to Sept. Under stones in fields, woods, not rare.

Galerita *janus*, Fab. May to Sept. Every where in woods under stones.

Lebia *grandis*, Hentz. *atriventris*, Say. July, Sept. In woods and fields under stones.

pulchella, Dej. Morrisania (Julich).

viridis, Say., *pumila*, Dej., *ornata*, Say., *fuscata* Say. June, July on flowers and bushes, Greenville, Ridgewood, Passaic.

pleuritica, Dej., *viridipennis*, Dej., (*Dianthomena*) *scapularis*, Dej., *analis*, Dej., with *ornata*, Say, in March and Oct. or Nov. on Fort Lee and in Jamaica woods under the dry leaves.

I have also one specimen of (*Aphelogeniu*) *furcata* Lec., from L. I.

Dromius *piceus*, Dej. May, June. Under bark of trees, Hoboken, Long Island.

Blechnus *linearis*, Dec. May to Oct. Under bark of trees (imago and larva.)

Metabletus *americanus*, Dej. Under bark of trees (imago & larva).

Axinopalpus *biplagiatus*, Dej. Id.

Plochionus *timidus*, Hab. Id.

Callida *purpurea*, Say. June. One single specimen taken under stone in Jamaica wood, L. I.

Pinacodera *limbata*, Dej. June. Under stones in moist spots, on Coney Island washed to the shore.

Cymindis *pilosa*, Say., and *C. americana*, Dej., June to Oct. under stones in fields and woods. L. I.

Apenes *lucidula*, Dej. and *sinuata*, Say. May, June. On the shore of Coney Island.

On the Anatomy of the N. A. Noctuidæ.

Part I. The Legs.

By John B. Smith.

II.

Aletia presents nothing noteworthy except the tarsal claw which is like that of *Euclidia crechtea* and shows a tendency downward.

Basilodes, *Stiria*, *Plagiomimus* and *Stibadium* which I consider generically indetical have a claw at the tip of the anterior tibia, have the anterior femur unusually large and the tibial excavation unusually small.

Right here as catalogued come several very peculiarly modified genera, the last mentioned may be considered as introducing them and all together they form a group peculiar to this continent, and generally to the more western part of it. It is to this group that the term "armed fore tibia" is peculiarly applicable, and I have described and figured all of them in my recent synopsis of the *Heliothinae*.

Xanthothrix Hy. Edw. embraces two rather dissimilar species, agreeing in the armature of the anterior tibia, and in the short compact legs; it is closely related to *Melipotria*, and *Axenus*.

Acontia shows a decided downward tendency: the anterior coxa is nearly as long as the femur, but heavier with a more decided groove: the tibia is slender, the excavation marked and long, the lappet being nearly as long as the tibia itself. The claws of the tarsi are long, slender and simple.

Gyros is an odd genus with very decidedly grooved anterior tibiæ and the lappet unusually large and prominent.

Euclidia begins the series of what is rather arbitrarily termed "*Fasciatae*".

The common species *erecta* Hb. has long anterior coxæ, slender legs, prominent spurs on median and posterior tibiæ, very heavily spined tarsi and claws the latter being flattened, wide and terminating with an acute hook; this form of claw is never so far as my observations extend formed in the typical *Noctua*, but is the prevailing form in the lower genera and more particularly the *D. lloidae*. The spurs on the median and posterior tibia are unequal, the inner are being longest, they are as widely separated as it is possible for them to be, and the anterior pair on posterior tibiæ are longest.

Litosea Grt. which in my opinion is generically identical with *Euclidia* has the posterior legs rather longer, and the proportion is rather more *pyralidiform* than in the other species of the genus.

Synedra has strong compact legs, more like those of the typical *Noctua*.

Parthenos and *Catocala* have strong, well developed legs, the ♂ often but not always, with a brush on the anterior tibia. The *femur* especially of the anterior leg is heavily grooved beneath to receive the tibia and its brush of hair; the groove being more decided in the ♂. The claws in *Catocala* are simple, while in *Parthenos* they are split.

Panopoda Guen. is peculiar, from the heavy clothing of the ♂ tibiae on at least two of its species.

The tarsal claw also of this species is unique so far as I have observed.

Remigia Guen. is peculiar by the clothing on the posterior tarsi of ♂ which somewhat resembles *Eriopus* but is much more dense.

Homoptera, taking *edusa* as the type has the legs short, compact and clothed with fine wooly vestiture, longer in the ♂: the tarsi are unusually short, the spinulation thin and very slender and the claws as in *Dra-steria*. The middle tibia is spinose.

Homopyralis, the last genus before the Deltoidae is peculiar as respects the structure of the anterior legs: the coxa is enormously developed, as long, and much heavier than the femur, the trochanter is unusually distinct and the femur tibia and tarsi are stout and strong: in the ♀ the spurs of the middle and hind tibia are decidedly unequal, and the upper are much longer than the posterior pair. In the ♂ the spurs are nearly equal, the posterior tibia has a distinct brush, the middle is very heavily clothed with scales and hair, while the anterior has the femur excavated above, to accomodate a very dense long brush of hair attached near the base, and has a very heavy clothing of long hair on the tibia, hardly forming a brush.

Pseudoglossa and *Helia* (*Epizeuxis*), the first genera in the *Deltoids* are peculiar in the structure of the anterior legs; this is identical in both genera.

The Coxa is very heavy, but little shorter than femur, hollowed out above however in such a manner that only a shell remains: the femur is heavy at base, but very much thinned just behind the middle, this excavation has precisely the length of the tibia which fits into it so completely that at first view it seemed as though there was a tarsus growing out of the femur. The tibia has the usual excavation, and in the ♂ a small brush which is wanting in the ♀. The tarsal claw is much like in *Herminia* except that the claw is longer.

(TO BE CONTINUED.)

Noli me tangere.

If a man works in any section of the Natural history for years forming hereby ideas of his own, he may, continuing his work on the basis of such ideas, very easily be induced to consider his ideas as dogmas.

Now another man applying his studies on the same branch may conceive ideas diagonally opposed to those of the first mentioned man and giving vent to them, this one is too ready to oppose that one; if wise he debates the matter composedly, but alas! too often he considers those heretical ideas, not as an attack against his dogmas, but as a personal attack.

Noli me tangere! Don't touch me! I do not speak of such low fellows, who having built up a system, somewhat unnatural of course, with great display of hard labor and brain-ruining effort, and upon finding things, that will in no ways fit in their systematic arrangement or that will destroy the whole system, will there upon rather crush and destroy the meddlesome species, which dares to make void and vain all the results of their great labor, than confess frankly that they are wrong.

One by predilection a describer of new things, will look always "rather for differences than for similarities", he will create new genera and species at wholesale, while another man working in the same line but looking rather for similarities than for differences will find many genera of the former gentlemen scarcely worthy to be considered as species and the new species of the same scarcely variations.

Then an endless war begins and who is right?

I can not see what an immense benefit the world at large and the Entomologist specifically may derive from the fact that a rubbed off, broken species be named "*Possibilitas* n. gen. *probabilis* n. sp. I guess we are not in such a hurry to have things named to be possibly such a species and belonging probably to such a genus. We always will wait willingly till with more material on hand a more proper decision may be pronounced.

Yet for many a great mind it is an invincible temptation to have his own dear "mihi" appended to a poor creature that the chance has laid in his hands, and if any dare differ from him, then!!! F. G. Schaupp.

Editors tables.

(In this department will be brought short notes from all sources, extracts from correspondence, hints, queries, criticisms and the like, and any facts of interest that our subscribers or correspondents may send to us will find a place here.—Editors.)

Longevity of Beetles. Mr. O. Reinecke of Buffalo writes: "In the morning of May 6th, I went with my partner Zesch, also a coleopterist to a small oak-wood situated near the park, to hunt for *Microclytus gazellula*. We cut there with hatchets pieces from the bark of the oak-trees which fell in the umbrella spread underneath and I had the good fortune soon to secure four of those lovely little *Cerambycides*. I put them into a vial filled with pure alcohol and when arrived home in the evening took them out and pasted them on small stripes of cardboard with shellac dissolved in alcohol, which dries very quickly. I left them two days on cork-sheets and then put them into one of the boxes of my collection, which close hermetically.

June 1st, viz 25 days afterwards I chanced to open that box and found to my greatest astonishment three of them running around and the fourth could not be found then in spite of careful researches. I put them into the cyanide-bottle, and by inspecting the box again next day (June 2nd) I found the fourth also very comfortably walking around in the box; probably he was hidden at first on the underside of another species.

I had sometimes examples of longevity among the *Curculios* but never among the *Cerambycidae*.

Man-eating Lucilia. Prof. Snow of Kansas published in *Psyche* IV, 27, an interesting article "*Hominivorous* [man-devouring] *habits of Lucilia macellaria Fab., the screw worm.*" This little fly is common from Argentine Republic to Canada and is well known to depredate on cattle and horses, as well as on men, (synonyms are *Lucilia hominivorax* Coquerel and *L. hominivorous* Cenic; South-America.)

The fly deposits its eggs in the nose of a (sleeping) man, the maggots cause great pain, perforating and destroying all the tissue covering the cervical vertebrae, the palatine bones, the os hyoides, the soft palate and causing in most instances death. As many as 300 larvae, were found in or dropped from one man's nose. Prof. Snow extracted some cases from medical papers, in one them Dr. J. Richardson of Moravia, Iowa, states that of twelve cases only one was known to him, in which the patient recovered.

Sea-shore-collecting. The waves having torn away the extensive bathing Pavillion of Brighton Hotel, Coney Island, the Building was erected further back, just at the place where, formerly I used to find *Dyschirius sellatus* quite frequent. Now that ditch having been laid dry, there was only a very small pool left 4 x 1 feet and at this spot I found 16 *D. sellatus*, about half the size of those captured in former years besides many *D. sphaericollis*, *Omophron labiatum* and *tesselatum*, also many *Heterocerus*. The *Omophron labiatum* were also very small.

F. G. S.

Synopsis of the genera of the N. A. Rhopalocera.

By John B. Smith.

The following table of genera has been compiled from actual examination of specimens in some groups, and from the works of Doubleday, Westwood, Hewitson, Scudder, Butler, Morris, W.H. Edwards and others. Hitherto no attempt has been made to tabulate all the genera or to give in this form a comparative and condensed description of the genera. Mr. Scudder in Vols. II and III of the Buffalo Bulletin, tabulates the *Nymphales* and *Rurales* (*Lycaenids* and *Erycinids*) and in the Boston Transactions classifies the *Hesperidae* without however satisfactorily defining the genera proposed or used by him. In the Butterflies genus making has been rampant and it is quite possible to find a different genus for every species in our fauna. Genera without number, yea families and sub families have been proposed, adopted and rejected—many without description, examination or study, and as a result there is a vast mass of names created and lying in wait for some resurrectionist, to be used by him to confuse and upset existing states of things and this opportunity has been and will continue to be used. To show the confusion caused—*Vanessa antiopa* has that name on the continent. Mr. Scudder for reasons given and which he deems satisfactory makes it the type of *Papilio* while Mr. Kirby makes its near allies *Nymphalis*!! So too of others, and in fact nearly each author uses a different term for a given insect and worse yet uses a given and well known term to apply to entirely different insects. Prior to Doubleday, Hewitson and Westwood's great work many of the genera were undescribed: that work gave careful descriptions of all the genera known to them, illustrated in almost every instance by a species on their plates. Mr. Scudder is the only American author that has done any systematic work in this line, but unfortunately he stands almost if not quite alone in his minute subdivisions, creating a new genus or using an old one for each of our three species of *Vanessa* so that I could use from him only structural characters primarily dividing his groups. Mr. W. H. Edwards' work on special groups or genera has not been overlooked and Mr. Butler's work in the *Satyridae* and elsewhere has been used. I have adopted the system of Doubleday and Westwood as used and modified by Mr. Edwards: in the *Hesperidae* I have used the characters proposed by Dr. Speyer in the appendix to Mr. Edwards' catalogue. Premising thus much and that the table has been compiled with particular reference to the American fauna I shall tabulate according to families.

Primarily the Lepidoptera are divided into two Divisions.

Antennæ clubbed at tip ; primaries at least and usually all wings elevated in repose

Rhopalocera.

Antennæ not clubbed at tip ; wings never continuously elevated in repose. *Heterocera.*

In some exotic species the antennæ are hardly perceptibly clubbed and in some *Gemetrilæ* the wings are elevated, but never as persistently during long rest as in the *Rhopalocera* or diurnals as they are usually called. No American species of butterfly departs from the characters above given.

The diurnals are divided into families of very different extent and value—the number recognized by different authors varying, one considering the families of another as mere subfamilies. Mr. W. H. Edwards recognizes five in our fauna which may be distinguished as follows.

Head moderate, antennæ approximate at base not hooked or acutely terminated at tip, all wings elevated in repose.

Imago with six fully developed legs in both sexes, chrysalis angular girthed at middle, larvæ elongate smooth *Papilionidæ.*

Imago with anterior tarsi aborted in both sexes, usually exarticulate in the ♂; tibia weak often brush like, chrysalis angular suspended by tail, larva often spined.

Nymphalidæ.

Imago with complete but weak anterior tarsi in ♀. exarticulate and not spined in ♂ which also has the tibia brush like. *Erycinidæ.*

Imago with anterior tarsi of ♀ complete, of ♂ weak and spinulated, often only one or two jointed, or if 5 jointed then never with complete claws at tip, chrysalis subulate, girthed at middle, larva onisciform. *Lycaenidæ.*

Head very wide, antennæ very widely separated at base, usually hooked or acutely terminated at tip, primaries always elevated in repose secondaries often horizontal 6 perfect feet in both sexes, larva smooth with first segment corneous, chrysalis often spinning a cocoon. *Hesperiidæ.*

Of these I consider the *Papilionidæ*, *Nymphalidæ*, and *Hesperiidæ* as entitled to family rank ; the *Erycinidæ* are not sufficiently distinguished from the *Lycaenidæ* and they in turn are through the former family closely related to the *Nymphalidæ*. As an illustration, the genus *Eumæus* may be cited which is placed by some authors in the *Lycaenidæ* and by others in the *Erycinidæ*. For convenience I retain all the families. I have placed the *Papilionidæ* first in the list though most systematists accord to the *Nymphalidæ* that rank. The discussion of the question of rank is not pertinent to the object of this paper, and I will only say that in my opinion the development of the *Papilionidæ*, is quite as high in one direction as that of the *Nymphalidæ* is in another. I am aware of all the larval and pupal characters relied on by the advocates of both theories and of the characters of the imago made use of by them.

The *Papilionidae* are divided as follows.

Anterior tibia with epiphysis ; hind margin of secondaries excavated and not grooved to receive the abdomen.....**Papilioninae.**

Anterior tibia without epiphysis ; secondaries with hind margin modified to form a groove enveloping the abdomen beneath.....**Pierinae.**

The *Pierinae* have been given family rank by some authors but they certainly can not be placed on an equality with the *Hesperidae* and given the same family value. The tibial epiphysis is a small, concavo convex lappet like organ, attached near to or above the middle of the inner side of the tibia, and covering a small excavation. It is universally present in the *Noctuidae*, but is only found in the *Papilionidae* and *Hesperidae* in the *Rhopalocera*. Westwood and others call it a spur, but it is not at all similar to the spurs of the median and posterior tibia. Speyer in Edwards catalogue, calls it the tibial epiphysis and I adopt the term. The *Papilioninae* are represented in our fauna by two genera.

Wings densely clothed with scales, antennal club arcuate, secondaries more less distinctly tailed.....**Papilio.**

Wings sparsely clothed with scales, antennal club not arcuate, secondaries entire, not dentate or tailed, abdomen of ♀ with a corneous pouch near tip.....**Parnassius.**

The *Pierinae* are more numerous represented ; the genera are as follows.

Antennae abruptly terminating in an ovoid club.

Head small short.

Antennae moderate, palpi slightly compressed, terminal joint long, color white or pale yellow, variegated with black, pupa angular.....**Pieris.**

Antennae short, palpi much compressed terminal joint short, color yellow or orange, with an auroral patch at summit of primaries, usually present at least in the ♂.....**Anthocharis.**

Heath large, bristled, antennae very short anterior margin of secondaries in ♂ with an oval glandular naked impression.....**Nathalis.**

Antennae gradually enlarging to an obconic club.

Secondaries without silvered spots beneath.

Antennal club truncate, primaries with costal margin moderately convex.....**Kricogonia.**

Antennal club not truncate, rounded ; primaries with a decided shoulder, near base.....**Terias.**

Secondaries with a silver or ferruginous discal spot beneath.

Antennae moderate, slender, slightly arcuate, club not truncate, inner margin of primaries sinuate.....**Callidryas.**

Antennae short, stout, straight, club truncate, inner margin of primaries straight.
Colias.

The order of the genera here is not that to be adopted for the cabinet ; that of the Brooklyn Check list may be used. Both *Colias* and

Pieris have been subdivided into two or by some authors three or more genera, but I can not convince myself that they are distinct. Each of the genera has a color appearance that renders it easily recognizable.

The *Nymphalidae* are much more numerous represented in our fauna, and they have been divided into several sub families, to which some authors accord family rank. They may be distinguished as follows. Secondaries not grooved for the reception of abdomen.

Wings narrow, outer margin rounded. *Heliconinae*.
 Secondaries with groove for reception of abdomen.

Palpi short.

Veins not dilated at base.

Subcostal nervure 5 branched, discal cell of secondaries evidently closed. . . .

Danainae.

Sub costal nervure 4 branched, discal cell of secondaries open, or closed by a very slender veinlet. *Nymphalinae*.§

Veins dilated at base.

Discal cell of secondaries open. *Nymphalinae*.§

Discal cell of secondaries closed. *Satyrinae*.

Palpi very long, projecting into a horizontal snout. *Libytheinae*.

The *Heliconinae* are sparingly represented in our fauna, and there is only one species (*charitonia*) that has any claim at all to be considered as properly belonging to it: some others are occasionally found not far from the southern borders and these I include. The genera are,

Internal nervure of secondaries present.

Median nervure 3 branched wings diaphanous.

Antennæ moderate, thorax stout, wings elongate rounded; secondaries rather short. *Dircenna*.

Antennæ long, thorax small, secondaries much elongate. *Ithomia*.*

Median nervure of secondaries apparently 4 branched. *Mechanitis*.†

Internal nervure wanting.

Head broad, eyes very prominent; antennæ long. *Heliconia*.

The genera all look very much alike and the insects are all very brightly colored and handsome.

The *Danainae* have but a single representation genus here. i. e. *Danaïs* easily known by the family characters and a peculiar swelling or raised black spot on the secondaries of the ♂.

§ *Ceratina* as used by Strecker in his catalogue is only a § of *Ithomia*.

† Apparently only, for it is merely the junction of the discoidal nervure with the 3rd which gives the former the appearance of a 4th branch.

The *Nymphalinae* are by all odds most numerous represented in our fauna, and the most difficult to separate: I have arranged them in the table in the manner which in my opinion will enable them to be most easily recognized.

Discal cell of primaries closed, of secondaries open.

Veins of primaries more or less dilated at base.

Palpi stout, tapering to tip, secondaries entire.....*Cystineura*.

Palpi slender, equal, secondaries angulate, sub caudate primaries sub falcate
Eunica.

Veins of primaries not at all inflated at base.

Tibiae not spinose.....*Colaenis*.

Tibiae spinose.

Secondaries not dentate caudate or scolloped.

Internal margin of primaries more or less sinuate.....*Agraulis*.

Internal margin of primaries not sinuate.

Outer margin of primaries straight or rounded scarcely emarginate or sinuate.

Wings broad triangular, head moderate small; size large.....*Limenitis*.

Wings narrower, apices more produced head large, body robust.....*Melitaea*.

Wings as before, more elongate, antennae more abruptly clavate palpi acicular.....*Eresia*.

Wings subtriangular, apex truncate outer margin of primaries slightly emarginate.....*Synchlœ*.

Outer margin of primaries strongly sinuate, apices produced, rounded.

Pyrameis

Secondaries dentate, margins of primaries subsinuate, wings rather narrow

Euptoieta.

Secondaries scolloped, primaries wide inner margin straight.....*Heterochroa*.

Secondaries lobate, or slightly tailed, primaries subangulate.....*Anartia*.

Discal cell of both wings closed.

Secondaries tailed or angulate.

Tibia and tarsi densely spinose; tail, of secondaries moderate, inner half of outer margin much longer than outer.....*Eurema*.

Tibia and tarsi feebly spined.

Primaries subfalcate, apex acute, body robust, wings wide, secondaries angular.

Paphia.

Primaries elongate, subtriangular, body very robust, secondaries scolloped.

Megistanis.

Secondaries not tailed nor angulate.

Head broad, antennae short, club pyriform, wings broad outer margin subsinuate.

Argynnis.

Head moderate, antennae short, club obovate with acute point; primaries with more arched costa and more sinuate outer margin.....*Diadema*.

Discal cell of both wings open.

Secondaries lobate or tailed.

Tails long, eyes naked, primaries angulate tibia and tarsi feebly spined....*Timetes*.

- Tails short acute, eyes naked, primaries large, tibia and tarsi densely spined....
Victorina.
- Tails short, rounded, eyes densely hairy, primaries angulate, secondaries angulate
 and margin scalloped.....**Vanessa.**
- Secondaries not lobate or tailed.
- Primaries falcate, body very robust anal angle of secondaries prominent
Agonisthos.
- Primaries not angulate.
- Eyes hairy, head broad, form stout wings triangular, secondaries obovate....
Callicore.
- Eyes naked.
- Tarsi strongly spined, outer margins of wings not scalloped.....**Junonia.**
- Tarsi feebly spined outer margin of secondaries scalloped.....**Apatura.**

In the table I have omitted *Phyciodes* which I think is not sufficiently distinct from *Melitæa* and *Grapta* which is equal to *Vanessa*. I have added a number of genera usually omitted in lists of our fauna and which indeed may not belong to it; Mr. Strecker catalogues them and usually *auct* Reakirt but Mr. Edwards does not include them in his list. The differences between the genera are very small indeed if structure be alone referred to, and the genera are more usually identified by their markings. An *Argynnis* once seen will be always known and the closely allied genera are recognized by color peculiarities more easily than by their scientific or systematic characters.

The *Satyrinæ* have also a very good representation here and they may be recognized as follows.

- Wings elongate, primaries with greatly produced apices and oblique outer margin.
- Middle tibia scarcely half as long as femur.....**Hipparchia.**
- Middle tibia more than half as long as femur.....**Chionobas.**
- Wings more rounded, apices of primaries not produced.
- Three principal nervures of primaries inflated at base.....**Coenonympha.**
- Not more than two veins inflated.
- Club of antennæ distinct, abrupt, flattened.....**Erebia.**
- Club of antennæ gradual, scarcely or not at all flattened.
- Middle tibia profusely armed with long stout spines.....**Gyrocheilus.**
- Middle tibia without spines or with but a few small weak spinules.
- Veins of primaries suddenly and greatly inflated.
- Margin of secondaries slightly dentate or waved.....**Satyrus.**
- Margins of secondaries entire: two nerves inflated.....**Neonympha.**
- Costal nervure only inflated, palpi twice as long as head.....**Ageronia.**
- Veins of primaries very slightly and gradually swollen or inflated.
- Secondaries entire not dentate.....**Satyrodes.**
- Secondaries distinctly dentate, sub caudate.....**Debis.**

Ageronia was placed by Mr. Westwood in a separate family; by Mr. Strecker our species is placed among the *Nymphalidae*; from its

characters I conceive it to be a *Satyrid*, and do not think that Mr. West-woods reasons for elevating the genus to family rank are good.

The *Libytheinae* are represented only by a single genus easily distinguished from all other butterflies by the enormously long palpi projecting snoutlike forward. The genus is : **Libythea.**

The *Erycinidae* have but a small representation in our fauna, generically and specifically considered and some of these are but doubtfully American.

The genera said to occur here are as follows.

Eyes hairy.

Antennæ with flattened club, thorax robust hind legs short stout.....**Nemiobius.**

Antennæ with incurved club, thorax small, hind legs long and slender.....**Charis**§

Eyes naked or very finely pilose.

Thorax ovate ; primaries with costa arched, apex obtuse or rounded, median and posterior legs short, robust, densely clothed with long scales.....**Eurygona.**

Thorax robust, costa of primaries straight or but slightly arched apices subacute, middle and hind legs long and slender closely scaled.....**Lemonias.**

Thorax robust wings large entire, antennæ short robust ; wings usually more or less suffused with metallic scales: beneath, with numerous patches of the same

Eumaeus.

Thorax small, apex of wing rounded, costa but little arched legs as before...**Charis.**

Eumaeus is probably only an occasional visitant. It is sometimes classed with the *Lycaenidae* but I prefer to leave it here for the present. The next family is the *Lycaenidae*, characterized by their small size usually blue or copper color whence their name "blues" and "coppers" often with very slight filiform tails and sometimes (*Thecla*) ornamented beneath with fine lines, whence they have been called "hair streaks."

The genera are as follows.

Wings rather short ; costa of primaries decidedly arcuate ; secondaries elongate, inner margin longest, often dentate ; generally with filiform tails. Species usually smoky gray or dull fuscous with an anal ocellate spot above**Thecla.**

Wings more elongate, costa but slightly arcuate, apices determinate : secondaries rarely tailed or dentate, more rounded, costal margin longest, color at least in one sex blue ; often ocellate below ; eyes naked, spinulation of tarsi feeble....

Lycaena.

As before ; eyes hairy, spinulation of tarsi strong.....**Chrysophanus.**

Wings large, primaries with rounded outer margin, costa arcuate at outer third : secondaries triangulate entire, not tailed, color fulvous-marked with black....**Fenesica.**

Chrysophanus I consider identical with *Lycaena*. With a few species only at hand or separation of the genera in easy ; with a large collection of native and exotic species I have found it impossible to make any satisfactory division into well marked genera : the characters are obscure not

permanent and the tarsi in some *Chrysophanus* are quite as feebly spined as they are in *Lycaena*.

Thecla is generally easily distinguished by the form of the wings, which however often approaches some species of *Lycaena*—especially those of the *Chrysophanus* group. In the latter there are variations of wing form without number but as a whole the primaries are narrower and longer, and the secondaries have the costal instead of the internal margin longest. *Fenesica* is in wing form somewhat different from the others of the family and the marking is unique. Mr. Scudder in Buf. Bul. III 98 et seq divides this family into 33 genera !!!

The next and last family is the *Hesperidae*, numerous in species, which are closely allied; their fascies is peculiar and they can be readily enough recognized by the characters given in the table of families.

The genera are as follows.

Hind tibia without middle spur.....*Carterocephalus*.
Hind tibia with middle spurs.

Tibiae (at least the middle pair) spined.

Secondaries not produced at anal angle.

Primaries elongate, blunt, abdomen exceeding secondaries*Ancyloxypha*.

Primaries shorter, costal margin curved at base, concave at middle, abdomen scarcely attaining hind angle of secondaries.....*Amblyscirtes*.

Secondaries produced at anal angle.

Antennae with on ovoid club, tip conical blunt.....*Thymelicus*.

Antennae with club suddenly bent at tip with a much contracted pointed little hook nearly half as long as the club.....*Pamphila*§

Tibia not spined.

Primaries of ♂ without costal fold.

Antennae short, suddenly inflated into an ovoid subtruncate club.....*Copæodes*.

Antennae longer, club ovoid suddenly bent at tip (as above described).*Pamphila*§

Primaries of ♂ with costal fold, without discoidal stigmata.

Brush at base of antennae long, distinct.

Club of antennae ovoid or rounded at tip, somewhat compressed.....*Pyrgus*.

Club of antennae spindle shaped.

Brush at base of antennae bristly, tibia and femur densely clothed with long hair.

Palpi moderate, densely clothed with bristly hair.....*Thanaos*.

Palpi shorter less densely bristled, club more slender.....*Systasea*.

Brush at base of antennae with scaly hair, not bristles.

Palpi more prominent than in *Thanaos* hind tibia with fewer and shorter hair.....*Pholisora*.

Brush at base of Antennae very short.

Club of antennae very slender, elongate, very strongly bent and terminating in a long fine point; wings often tailed.....*Eudamus*.

Club of antennae very short and thick acutely terminated; wings not tailed

Aegiale

The following genera of *Hesperidae* were accidentally omitted from the Synopsis and the omission was not discovered until too late to insert in their proper place in the table ; the characters here given will I hope enable students to recognize them.

Achylodes has the family characters but differs from all other American genera in the wing form which is irregular ; the primaries are acute, pointed, emarginate beneath tip ; the secondaries are subangulate. Antennæ long and slender, club elongate curved, tip acute, slightly recurved.

Pyrrhopyga. Body very robust, wings small, head and tail often clothed with orange scales. Head large, palpi convex, closely appressed to front, terminal joint minute. Antennæ short thick, terminated by a curved robust club, obtuse at tip. Wing form of *Eudamus*.

Erycides differs from the preceeding only by the slender hooked termination of the anteunæ ; wing form of *Pamphila*.

The two last mentioned genera closely resemble *Eudamus* in their superficial appearance and in all essential structural characters ; the primaries however are a little more pointed and the insects are a little more "rakish" in appearance.

Olla Podrida.

By W. J. Holland, D. D.

When at Berkeley Springs, last summer, I found a larva of *Citheronia sepulchralis*, feeding on the scrub-pine. I placed it in a tin box plentifully supplied with provender, and carried it with me *via* Washington to the White Sulphur Springs. It made its last moult there and continued to feed. About the time I was ready to leave, it showed a disposition to pupate. I took a small box and filled it with clay and moulded in it a cell large enough to accommodate his majesty. I covered the cell with a layer of clay, leaving a hole in the top for purpose of inspection, and wrapping it all up in cotton carried it with me ; my route was to Indianapolis, *via* Cincinnati. At Lexington, Ky., I took a peep into the box. The insect seemed comfortable. On reaching the hotel where I spent a day in Cincinnati. I found to my delight that there was a Chrysalis, green in color, and perfect in form in the cell. By night it had become black, and hard. A couple of weeks ago I had the pleasure of seeing a perfect moth emerge. I venture to suggest this is the first larva of *Citheronia sepulchralis* that has pupated on an express train. And I commend my plan of helping nature to those who may be travelling and who may chance to find the larvæ of rare moths which transform in the ground.

*
* *

Last December shortly before the Christmas holidays a hat store in Pittsburgh was found to be alive with specimens of *Aletia argillacea*. The clerks say nearly a peck of them were swept out into the snow. The windows were alive with them and in every cranny and behind every hat box they were found. The weather was very cold at the time, though the building was warm. I have a number of specimens of the swarm, a young entomological friend having captured in his cyanide jar nearly a pint of them. Mr. A. Koebele, of Washington, D. C., informs me that this is the most northerly instance known of the swarming of this species so late in the season. Where did they come from?

*
* *

The singular difference between the mouth organs of the two sexes in *Eupsalis minuta* has been noted with curiosity by naturalists. My esteemed friend Dr. John Hamilton of Allegheny, Pa. tells me the male employs the singular forceps with which he is armed in extricating the proboscis of the female from the bark of the tree in which she sometimes gets stuck boring a hole in which to deposit her eggs. Here is certainly a most remarkable provision on the part of nature to meet contingencies. The family starts out with an auger and a pair of plumbers tongs with which to do the mechanical work necessary to the perpetuation of the species.

On the Anatomy on the N. A. Noctuidae.

Part I. The Legs.

(Continued from p. 34.)

Hermia (Chytolita) marbidalis, is almost the reverse of the foregoing so far as the anterior legs of the ♂ are concerned: the median and posterior legs are long and slender, showing no remarkable peculiarity and the anterior legs of the ♀ are except for the proportion, in which they agree with the ♂, normal. The ♂ has the anterior coxa, femur and tibia of nearly equal length and very slender, the coxa is very decidedly excavate above leaving only a mere shell, and there is a heavy brush of hair, attached at base. The femur is equally slender, and also excavated above and it has a very heavy brush of hair attached at tip. The tibia is slender, has a very decided excavation at base on the inner side covered by the small lappet, and has the entire outer side grooved for the reception of the heavy brush of hair attached at base. The unusually slender

anterior legs, so grooved as to have them practically without strength at all, render this genus peculiar. Similar to it is *Zanclognatha*; here also the ♂ of some of the species have the tufts and excavation of *Herminia*, but not all are so modified.

In addition to the modified anterior legs, the proportionately long median and posterior pairs, with the unequal and slender spurs distinguish this section. The spurs are more weak and slender than in *Noctua*, and are clothed to the tip with scales.

Coptonemis Zell. which is unknown to me except from descriptions seems to be peculiar by the form of the posterior tibia, which is said to be decidedly bent inwardly just below the knee.

Palthis is another genus peculiar in some respects. The general form of the legs is like *Herminia*, and the sexual tuftings are identical; the lappet covering the excavation of anterior tibia is unusually small, the spinulation of tarsi present but almost obsolete and the claw of the tarsi proportionately very small. The posterior femur has an excavation on the upper side from before the middle to the tip.

Bomolocha seems to have the peculiarities of this section only, among which are the brushes on the anterior legs of ♂ of some of the species.

Plathypena has the anterior coxæ $\frac{2}{3}$ as long as the femora, but does not otherwise differ from the other genera of this section.

Sufficient has now been given to show the drift of variation. This in the coxa is a gradual increase in size and mobility from the highest group to the lowest, in which it equals the femur in the anterior leg, and is only slightly less moveable.

The femur seems to gain in length, and loose in weight as we go downward, and while only slightly grooved in the higher groups, is decidedly so in the lower.

The tibiæ vary in different ways: the anterior, from the form shown in *Agrotis* to the form shown in *Triopis*, in one direction, and to the form shown in *Herminia* in the other: *Schinia* is the type of a very peculiar group, diverging from the type *Noctua* in many respects other than that of the legs: it is indoubtedly a Heliothid but closely related to the *Plusiadae* and *Acontiadae*, giving each of these groups for the nonce family terminations. The median tibiæ seem to present a smaller range of variation, becoming only longer and more slender. The posterior seems to present no greater range of variation; but the spurs do. Weak short and equal in the *Bombycid* group they attain their greatest strength in the type *Noctua*, increasing in length but becoming more weak in the

Deltoidae. The proportion they bear to each other also varies, the inner becoming longer in the lower groups.

The tarsi present no important variations, but the claws do. Simple in the *Bombycid* group, they are distinctly, though not strongly dentate in the typical *Noctua*, becoming more decidedly so in the *Heliothid* group above referred to: Lower in the scale they become more flattened, and decrease in size in the lowest: they are bifid in one instance but usually have a long acute tooth as in *Euclidia*.

A characteristic feature of the lower groups is the difference in sex: In the type *Noctua* there is scarcely any difference between the sexes so far as the clothing of the legs are concerned. Lower in the scale, the ♂'s have them clothed with longer hair, until in the lowest group we find the *Herminia* type most common.

Ova of *Amphidasis cognataria*.

On June 3rd I obtained eggs of this insect. They are cylindrical in shape, with hemispherical ends: surface with longitudinal rows of concave hexagonal facets: color greyish green, length .75 mm, transverse diameter .375 mm. The female from which the eggs were obtained deposited about 500.

A. W. P. Cramer.

Dr. James S. Bailey.

It is with feelings of sincere sorrow and regret that we have to record the death of Dr. Bailey of Albany, New York. Dr. Bailey was well known to all collectors and students of Lepidoptera, and many a beginner has a vivid recollection of aid in information and specimens obtained from him. He was an enthusiastic collector, a patient student and while he never did much as a systematist yet his patient observation of the habits and history of many wood borers—*Cossus* particularly—whose lives extend through a period of several years entitle him to a high rank as an entomologist. Ready for publication prior to his death was a work containing the results of his observations on some *Cossidae*, illustrated by colored plates. We hope that this work will still appear, and its appearance will enhance the regret felt at the loss of so careful and conscientious an observer.

SYNOPTIC TABLES OF COLEOPTERA.

CALATHUS Bon.

See Dr. Leconte's *Synopsis of the species of Platynus and allied genera, inhabiting the United States*. Proc. Ac. Phila. 1854, pag. 36.

Thorax not narrowed behind, basal foveæ obsolete.

Body elongate, thorax as broad as long.

Sides moderately reflexed 1. *gregarius*.

Sides narrowly reflexed 2. *ingratus*.

Sides moderately depressed, elytra subopaque 3. *opaculus*.

Sides scarcely rounded, very little depressed, scarcely narrowed at apex, elytra subopaque 4. *quadricollis*.

Body less elongate, thorax broader than long, elytra subopaque,

Sides much rounded depressed 5. *Behrensi*.

Sides little rounded, depressed, thorax towards base gradually narrower ... 6. *obscurus*.

Sides much rounded, scarcely depressed 7. *ruficollis*.

Thorax narrowed behind, basal foveæ broad.

Margin of thorax broadly reflexed 8. *advena*.

Thorax nearly rounded, basal foveæ large.

Thorax a little longer than broad, scarcely narrowed behind ; elytral striæ deep, interstices convex 9. *impunctatus*.

Thorax obovate, convex, basal foveæ deep, narrow, elytral striæ fine, interstices flat 10. *dubius*.

Bibliography.

1. *gregarius*, Dej. Spec. III, 76. Say. Trans. Am. Ent. Soc. II, 47. *distingendus*, Lec. Proc. Ac. Phila. II, 49, N. Y. to Fla. Tex. 10.8 mm.
2. *ingratus*, Dej. Spec. III, 77. *confusus*, Lec. Proc. Ac. Phila. 1854, p. 36. *incommodus*, Mann. Bull. Mosc. 1853, III, 139. Alaska, Can. 8 to 9 mm.
3. *opaculus*, Lec. Proc. Ac. Phila. 1854, 37. M. S. & W. St. 9 to 11 mm.
4. *quadricollis*, Lec. l. c. Cal. 7 to 10.5 mm.
5. *Behrensi*, Mann. Bull. Mosc. 1843, II, 195.
6. *obscurus*, Lec. l. c. p. 37, Cal. 10.8 mm.
7. *ruficollis*, Dej. Spec. III, 78 ; Lec. l. c. Cal. 9 to 10.8 mm.
8. *advena*, Lec. Ann. Lyc. IV, 217. *mollis*, Esch. Mem. Mosc. 1823, VI, 141. *dulcis*, Mann. Bull. Mosc. 1853, III, 141. Alaska, Lake Sup. N. H. 9 to 10 mm.
9. *impunctatus*, Say. Trans. Am. Philos. II, 45. *americanus*, Dej. Spec. III, 83, N. Y. M. St. 10 to 11 mm.
10. *dubius*, Lec. Proc. Ac. Phila. 1854, p. 38. Col., N. Mex. 12 to 13 mm.

SYNOPTIC TABLE OF THE SPECIES OF

BRADYCELLUS Br.

See Dr. Leconte's Notes on the species of *Agonoderus*, *Bradycellus* and *Stenolophus* inhabiting America north of Mexico. Proc. Ac. Phila. 1868, pag. 379.

- Form very elongate, thorax with a strongly beaded margin, the basal impressions long and deep. Middle tarsi of male with squamules.....**linearis**.
 Form not very elongate, thoracic bead very narrow, basal impressions short not deep, often very feeble. Middle tarsi of male without squamules.
 Head punctured near the eyes posteriorly.....**cognatus**.
 Head smooth.
 Hind angles of thorax broadly rounded, scarcely punctured.....**neglectus**.
 Hind angles of thorax distinct.
 Thorax without punctures near the hind angles.....**cordicollis**.
 Thorax distinctly punctured.
 Hind angles of thorax obtuse, thorax wider than long.
 Basal impressions broad, shallow, strongly punctured, and thorax obliquely subsinuate near base.....**rupestris**.
 Basal impressions broad, sparsely punctured, thorax scarcely sinuate near base.....**tantillus**.
 Basal impressions feeble with a few punctures only, thorax as in *tantillus*...**nigriceps**.
 Hind angles of thorax rectangular or nearly so, thorax subsinuate behind the middle.
 Thorax a little wider than long, basal impressions more punctured.....**californicus**.
 Thorax nearly as wide as long, basal impressions sparsely and finely punctured.....**rivalis**.

linearis Lec. New Spec. I, 16. Pa. Wisc. 5.5 mm.

cognatus Payk. Fn. Suec. I, 146. Dej. Icon. t. 194 f. 3. *longiusculus*! Mann. Bull. Mosc. 1853, III, p. 125; *nitens*, Lec. Proc. Ac. Phila. 1858 p. 60, *axillaris* Mann. Bull. Mosc. 1853, p. 124. Europe and North America. 4.5 to 5 mm.

neglectus Lec. Ann. Lyc. IV, 407, Trans. Am. Philos. X, 385. Makinaw Isld. 3.25 mm.

cordicollis Lec. Ann. Lyc. IV, 406. Lake Sup. 5 mm.

rupestris Say, Trans. Am. Philos. II, 91; *elongatulus* Dej. Spec. IV, 457; *flavipes* Kirby, Fn. Bor. Am. IV, 47, *cinctus* Say, Trans. Am. Philos. IV, 434; *congener* Lec. Ann. Lyc. IV, 306; *parallelus* Chaud. (Extr.) Rev. et Mag. Zool. 1868, p. 16. ? *debilipes*, Say. Trans. Am. Philos. IV, 425. U. St. 4.75 mm.

tantillus Dej. (*Acupalpus*) Spec. IV, 465. Chaud. (Extr.) Rev. et Mag. Zool. 1868, p. 17. *difficilis* Dej. Spec. IV, 435. U. St. 3 mm.

nigriceps Lec. Proc. Ac. Phila. 1868, p. 381. N. J., Va. 3.75 mm.

californicus Lec. Pac. R. R. Expl. XI, 2. Ins. 29. Cal. 3 to 3.25 mm.

rivalis Lec. Proc. Ac. Phila. 1858, p. 61. Col. 3.75 mm.

SYNOPTIC TABLES OF COLEOPTERA.

TACHYCELLUS *Moraw.*

By Geo. H. Horn, M. D.

This genus differ from *Bradycellus* in having three joints of the antennæ glabrous. The third joint and even the first two are not entirely hairless, but they have not that fine pubescence which occur in the following joints.

Our species are as follows :

Elytra with the entire number of striæ.

Hind angles of thorax rectangular.

Black, legs black (except the base of tibiæ); base of thorax impunctured.....

nigrinus.

More or less testaceous, legs pale.

Thorax wider at base than long, its color piceous with a very narrow pale edge

Kirbyi.

Thorax not wider at base than long.

Thorax testaceous with large central piceous spot.....**atrime dius.**

Thorax testaceous.....**nebulosus.**

Hind angles of thorax obtuse.....**badiipennis.**

Elytra nearly smooth, the two striæ nearest the suture alone impressed.....**nitidus.**

The males of these species (except *nitidus*) have distinct squamules on the middle tarsi. In *nitidus* the second ventral segment at middle has two small pubescent spots the one behind the other. In *Bradycellus* the existence of one spot is usual, but it has never been observed in any other *Tachycellus*.

T. nigrinus Dej. (*Harpalus*) Spec. IV, 399; Mann. Bull. Mosc. 1843, II, p. 213; Motsch. Kaef. Russl. 22; *quadricollis* Lec. (*Geobænus*) Ann. Lyc. IV, 405. var. *tibialis* Kirby, (*Trechus*) Fauna Am. Bor. IV, 46. Length 5.5 to 6.5 mm. Alaska, Cal. Can.

The form described by Kirby differs only in having the hind angles of the thorax less distinct than in the typical form. The number of specimens now in hand makes it possible to place *tibialis* as a synonym as was intimated by Dr. Leconte (Proc. Ac. 1868, p. 382.)

T. Kirbyi n. sp. Piceous, shining, elytra with base and sides paler, legs testaceous. Head smooth, antennæ piceous, three basal joints paler. Thorax broader than long, sides moderately arcuate in front, slightly sinuate posteriorly, hind angles acutely rectangular, disc feebly convex, lateral margin narrowly rufous, median line rather deeply impressed, basal impressions broad, but not deep, coarsely and sparsely punctured. Elytra piceous, paler at base and sides and often along the suture, basal margin interrupted at the scutellar stria, which is moderately long, surface rather deeply striate, intervals slightly convex. Body beneath smooth. Length 24 inch. 6 mm.

This species has the form of *badiipennis*, but has the hind angles of the thorax acutely rectangular, in this respect it agrees with *atrime dius* which is however a more elongate and parallel species, very differently colored.

Described from specimens collected by Mr. Johnson Pettit near Grimsby, Ontario. occurs also in Ohio.

- T. atrimedi* Say, (*Feronia*) Trans. Am. Philos. Soc. II, 39; *similis* Kirby (*Trechus*) Faun. Bor. Am. IV, 48. Length 7 mm. Can. to Texas.
- T. nebulosus* Lec. Trans. Am. Philos. Soc. X, 385; *suturalis* Lec. (*Acupalpus*) Ann. Lyc. IV, 411. Length 4.5 mm. Ga. to Texas.
- T. badiipennis* Hald. (*Stenolophus*) Proc. Ac. I, 302; Lec. Trans. Am. Philos. Soc. X, 385; *ruficus* Lec. (*Geobænus*) Ann. Lyc. IV, 304; *lugubris* Lec. *ibid.* p. 305. Length 5 to 6 mm. Can. to Kans. and Va.
- T. nitidus* Dej. (*Acupalpus*) Spec. IV, 474; Mann. Bull. Mosc. 1843. II, p. 214. Length 4.5 to 6.5 mm. Or., Cal.
- Other details of the species above cited will be found in a paper by Dr. Leconte (Proc. Ac. 1868, p. 379) in which they are included in *Bradycellus*.

DISCODERUS Lec.

By Geo. H. Horn, M. D.

The species of this genus very closely resemble each other and are extremely difficult to separate in any tabular arrangement. The following table will assist in their recognition, but can not be entirely depended upon with uniques.

Thorax narrowed at apex.	parallelus.
Thorax with base and apex equal, the sides regularly arcuate.	
Side margin of thorax depressed posteriorly and slightly reflexed.	impotens.
Side margin not reflexed.	tenebrosus.
Thorax distinctly narrower at base.	
Body above piceous.	robustus.
Body above bicolored, thorax and head rufo-piceous, the elytra bluish.	amoenus.

D. parallelus Hald. (*Selenophorus*) Proc. Ac. I, 301; Lec. Ann. Lyc. IV, 290.

In this species the thorax is perceptibly narrower at apex than at base. The side margin posteriorly is narrowly depressed, and with numerous minute punctures. Color piceous without metallic lustre, antennæ pale. Length 7 to 7.5 mm.

Occur most abundantly in Texas and New Mexico, but specimens have been received from Pa. and Ga.

D. impotens Lec. Journ. Ac. IV, 1858, p. 14. ?*americanus* Motsch. Bull. Mosc. 1859, III, p. 137. pl. 3, fig. 3.

Beneath rufo-piceous above piceous with slight greenish surface lustre. Thorax equally wide at base and apex, with side margin depressed posteriorly and very slightly reflexed. Length 9 mm. Occurs in Texas, Arizona and New Mexico.

D. tenebrosus Lec. (*Selenophorus*) Ann. Lyc. IV, 291.

Piceous, surface without metallic lustre, legs somewhat paler, antennæ testaceous. Thorax equally wide at base and apex, the side margin not depressed. Length 5.5 mm.

Occurs in New Mexico and is our smallest species.

D. robustus n. sp.

Brownish beneath, piceous or black above, legs pale when less mature, antennæ pale. Form rather robust. Thorax distinctly narrower at base than at apex, the side margin vaguely depressed, with very few minute punctures and slightly wrinkled along

the base. Elytra deeply striate, the intervals flat. Metasternal episterna short, scarcely longer than wide in front. Length 8.5 to 11 mm.

This is the largest and most robust in its facies of any species in our fauna.

Occurs in Arizona.

D. amoenus Lec. New Species 1863, p. 14.

Body beneath, head and thorax rufo-piceous, elytra with bluish surface lustre. Thorax narrower at base than at apex, the margin narrowly depressed and reflexed posteriorly with a few punctures along the base. Length 8.5 mm.

The slender form and style of coloration render this species at once the prettiest and most easily known of the genus.

Occurs in Utah and New Mexico.

The genus *Discoderus* belongs to that series of the Harpalide Carabidæ in which the anterior tarsi of the male are not dilated. The males however, have the middle tibiæ more curved than the females and denticulate within. The last ventral segment of the males has but one setigerous puncture on each side of the anus while the females have two.

ACONODERUS *Dej.*

(a without gonos angle dera neck.)

See Leconte Notes on the Species of Agonoderus etc. Proc. Ac. Phila. 1868. p. 373.

Body stouter and more convex, thorax transverse, quadrate oval.

Hind angles of thorax much rounded.

Pale yellow above, thorax with two discoidal spots, scutellar stria long, elytra with two dark stripes, separated by the sutural interval; dorsal punctures distinct

1. lineola Fab.

Dark testaceous or piceous, narrow margin of thorax and broader one of the elytra pale; scutellar stria shorter, dorsal punctures wanting

2. infuscatus Dej.

Body more elongate, less convex; thorax scarcely wider than long, subtrapezoidal, more or less distinctly narrowed behind; elytra with one dorsal puncture.

Larger species, color pale, elytra with a wide black stripe, divided by the suture; disc of thorax frequently with a large black spot, head always black.....

3. pallipes Fab.

Smaller species.

Head black, scutellar stria distinct.

Thorax pale, body beneath dusky

Basal impressions well marked with a few coarse punctures, elytra with broad dusky stripe or cloud, divided by the sutural interval thorax dusky beneath

4. partarius Say.

Basal impressions less marked and more sparsely punctured, elytra dusky with suture and margin pale; thorax and sometimes abdomen pale.....

5. pauperculus Dej.

Thorax with a large blackish spot on disc; elytra blackish with suture and margin testaceous.....

6. indistinctus Dej.

Head pale of the same color as the thorax, body beneath testaceous, or ferruginous, not blackish, scutellar stria short or wanting.

Scutellar sffria punctiform, disc of elytra sometimes with faint dusky cloud. . . .

7. *testaceus* Dej.

Scutellar stria distinct though short, not punctiform. 8. *micros* Lec.

1. *lineola* Fab. (Carabus) Ent. Syst. I, 155. Oliv. Ent. III, 35 p. 78, pl. 7, f. 75, Dej. Spec. IV, 51, *furcatus* Fabr. Syst. El. p. 206, *maculatus* Lec., Pro. Ac. Phila. 1868, p. 374. Specimens from the middle of the continent completely unite the eastern and Pacific forms. U. S. 7—8.5 mm.
2. *infuscatus* Dej. Spec. IV, 54, *suturalis* Lec. Ann. Lyc. IV, 373. N. Y. E. St. Fla. Tex. 5—6 mm.
3. *pallipes* Fab. (Carabus) Ent. Syst. I, 159. Oliv. Ent. III, 35, p. 89, pl. 9, f. 99, Dej. Spec. IV, 53. *Lecontei* Chaud. (Extr.) Ann. et Mag. Zool. 1868, p. 14. *rugicollis* Lec. Proc. Ac. Phila. 1859, p. 83, *comma* Fabr. Ent. Syst. I, 165, *dorsalis* Lec. Ann. Lyc. IV, 373, U. S. 5.5—7 mm.
4. *partitarius* Say, Trans. Am. Philos. Soc. II, 90 U. St. 3.5—4 mm.
5. *pauperculus* Dej. Spec. IV, 453, *consimilis* Dej. ibid. IV, 465. S. St. 3—3.25 mm.
6. *indistinctus* Dej. Spec. V, 846 ?*humilis* Dej. Spec. IV, 462 ?*difficilis* Dej. Spec. IV, 435. 3—4 mm.
7. *testaceus* Dej. Sp. IV, 460, N. Y. 2.5—to 3 mm.
8. *micros* Lec. Ann. Lyc. IV, 412. E. St. 2.75 mm,

Larva of *Galerucella sagittariæ* Gyll.

By F. G. Schaupp.

On the leaves of the yellow pond lily I found in July larvae of all sizes, pupæ in all states of formation and imagines of *Galerucella sagittariæ* Gyll. in all states of maturity. The larva is bluish black above, yellow beneath; head small and smooth except for a central frontal depression which is punctured; mandibles tridentate, middle tooth most prominent; mouth parts thick and fleshy. Form elongate; when fully grown $\frac{3}{8}$ inches in length, widest at middle and tapering each way. First segment longest and depressed, flattened; all others nearly equal, all with a longitudinal dorsal line and a deep transverse impressed line—surface scabrous, sides with a row of brown tubercles—one on each segment. Legs yellow, joints black, anal segment furnished with a pro-leg. Pupa shorter and broader, retaining markings of larval form on abdomen but adding rudiments of wings (which are free) legs and antennæ. At first they are entirely yellow, but soon turn black. The eggs are yellow, ovate and are laid in small patches on the upper surface of the leaf. Many larvae are found together on a single leaf, and there was scarcely one which was not infested with these unsightly slugs. They eat the upper surface of the leaf only and seldom make holes, but the leaves become brown and unsightly and lose all their beauty. The white lily seems less to their taste for they do not touch that so far as I could see.

SYNOPSIS OF BUTTERFLIES.

EUREMA, *Bd.*

General body form and habitus as in *Vanessa*. Wings strong ; primaries triangular with rectangular apices, slightly produced at the 5th vein and subsinuate beneath to hind angle which is evident. Secondaries tailed, the interior half of wing decidedly longer than the outer.

One species only is usually included in our fauna.

E. lethe, Fab. Ent. Syst. III, 1. p. 80 (*Papilio*); *demonica* Hb., Sam. Ex. Schmett. II, f. 1, 2, (*Hypanartia*).

Above pale fulvous, darker at interior half of secondaries, primaries with apical third, outer margin and an oblique dash from near base of costa to hind angle, black ; apical space with two oblique and interrupted fulvous bands. Secondaries with an elongate patch from apex toward middle, a marginal and sub marginal interrupted line, black. Beneath, primaries fulvous irregularly marked and mottled with ferruginous lines and dark patches. Secondaries at base and costal margin yellow, else fuscous somewhat dusted with blue scales along and near anal angle and anal half of outer margin ; several more or less distinctly ocellate spots, and irregular ferruginous and darker lines varying wing.

Expands 2 inches, *Hab.* Texas, Mexico, Centr. and S. America.

ACERONIA, *Hb.*

This genus has the head broad, the eyes prominent and the body robust. Costal nervure dilated for a large part of its course, median and submedian swollen or dilated only at base. Anterior tarsi of ♂ exarticulate, of ♀ 5 jointed and without claws. In the Synopsis of genera *ante* the distinguishing characters of the genus were pointed out and they need not be especially recapitulated here.

The pupæ are slender, braced (i. e. girthed at middle) and have on head two earlike tubercles. The imagines are rapid flyers, are said to produce a squeaky sound, alight and rest on the trunks of trees head downward and with wings expanded. These peculiarities were deemed sufficient by Messrs. Doubleday Hewitson and Westwood to authorize its elevation to family rank and the butterflies are certainly anomolous

Two species are said to belong to our fauna.

Wings greenish irregularly marked with zig zag black lines and brown shades **feronia**.
Wings mouse gray ; outer $\frac{2}{3}$ of primaries white with oblique dark and bluish shades
and circles.....**feronax**.

A. feronia, L, Syst. Nat. X. Ed. p. 473 (*Papilio*); Hb. verz. Bek. Schmett. p. 42, (*Ageronia*).

Easily known by the pale bluish green body color mottled and marked with irregular black lines and brown spots, pupilled and surrounded by greenish blue. Beneath, paler more whitish, outer half of wings irregularly mottled with black.

Expands 2—2.5 inches. *Hab.* S. W. Texas, and Southward.

A. fornax, Hab. Sam. Ex. Schmett. II.

The predominant color is a soft reddish grey, primaries as above described, secondaries with marginal black lines, two bands in the cell, a white shade on inner margin toward apex and a submarginal row of white spots margined with black and with a fine circle of black within spot.

Expands 3 inches. *Hab.* S.W. Texas and Southward.

EUNICA, *Hb.*

This genus Doubleday and Westwood make a § of *Myscella*, and characterized as such, it has a narrow very hairy head, eyes small, naked and prominent, antennæ long and slender, club gradual, compressed, marked with two distinct grooves, Thorax moderate, wings subtriangular apex truncate, outer margin subemarginate, costal and median nervures swollen at base. Secondaries with shoulders much produced.

We have but a single species.

E. monima, Cram. Pap. Ex. III, t. 387, F. and G. (*Papilio*) Herr. Sch. Reg. Corr. blatt. Z. M. Verz. 18, 162 (*Eunica*) var. *modesta* Bates, Ent. Mo. Mag. I, 113.

Above smoky brown; primaries apical half black, with two oblique rows of white spots: beneath paler, apical black of primaries not reaching the margins, white spots more or less distinctly reproduced. Secondaries above uniform, beneath bluish grey with five distinct black lines the 3d and 4th from base joined at inner margin and enclosing several black spots.

The var. *modesta* Bates which I have seen, differs in the more uniform coloring of the upper surface, and more or less complete lack of white spots near apex. Messrs. Kirby and W. H. Edwards accord it specific value and Mr. Strecker makes it a synonym.

Expands 1.5 to 1.75 inches. *Hab.* Tex., Flor. and Southward.

CALLICORE, *Hb.*

Head moderate, broad, hairy; eyes oval hairy; tongue slender. Antennæ slender, club short, abrupt, obtuse: primaries trigonate, margins rounded, secondaries obovate, shoulder prominent.

Our only species is very handsome and is

C. clymena, Cram. Pap. Ex. I, t. 24, E. & F. (*Papilio*); Hb. Verz. Bek. Schmett. p. 41, *Callicore*.

Above black, primaries with an oblique iridescent blue band and a subapical white spot. Beneath, primaries at base pale, middle bright red, followed by a broad black shade, apex white : secondaries white or greyish, with a marginal red band, a basal black line and a large oval formed by a fine black line and enclosing two smaller ovals formed in the same way.

Expands 1—1.5 inches. *Hab.* So. Fla. and Antilles.

A very beautiful little butterfly and one which there is little danger of mistaking.

TIMETES, *Bd.*

The species of this genus are easily distinguished by the wing form, in addition to the characters mentioned in the synopsis. The primaries are broad the apex is produced. margin more or less emarginate beneath and somewhat angulate or scalloped ; secondaries with two tails, the outer long and slender, the inner formed by a prolongation of the anal angle, shorter and broader. In these characters all our species agree, but in coloration and in some details of wing form they fall into two very distinct sections as follows.

Above smoky or fuliginous, beneath with base silvery white, inner tail of secondaries short.....§**Marpesia**.
Above fulvous, with fine black lines, beneath concolorous, inner tail of secondaries longer.....§**Athena**.

§ **MARPESIA**.

Above dark fuliginous with a paler more reddish outer margin.....**Coresia**.
Above paler with margin and 4 distinct transverse shades darker and five white spots near apex.....**chiron**.

§ **ATHENA**.

Primaries greatly emarginate below apex, the latter truncate; secondaries with apices emarginate : color paler with three straight black lines the 2d and 3d joining at inner margin**peleus**.
Primaries less emarginate below apex, the latter rounded, secondaries with apices scarcely emarginate : color darker, with similar lines angulate at median vein, ...
eleucha.

T. coresia, Gdt. Enc. Meth. IV. 359 (*Nymphalis*) Doub. and Hew. Gen. Diur. Lep. II, 263 (*Timetes*); *zerynthia* Hb. Sam. Fx. Schmett. II, (*Marpesia*).

The silvery space beneath has three fine brown lines and is margined with velvety brown outwardly ; the outward brownish space has a fine purplish gloss. In this as the next species the apices of primaries are produced and rounded.

Expands 3 inches. *Hab.* Texas and Southward.

T. chiron, Fabr. Syst. Ent. p. 452 (*Papilio*); *Chironias* Hb. Verz. Bek. Schmett. p. 47 (*Marpesia*).

Much like the preceeding beneath; but the silver is glossed with blue, the lines crossing it are yellow and are wider, the secondaries have an admixture of blue scales most distinct near anal angle, and there have a number of ocellate spots, reproducing the same on upper side. Above the color is paler with four distinct transverse shades on both wings and five small white spots placed in two series near the apex.

Expands 2—2.5 inches. *Hab.* Texas and Southward.

T. peleus, Sulz. Abg. Gesch. Ins. t. 13, f. 4 (*Papilio*); *thetys* Fab. Gen. Ins. p. 264 (*Papilio*); *petreus* Cram. Pap. Ex. 1 t. 87. Stoll. Sup. Cramer, t. 2, f. 2 a, 2 b, 2 c, larva et pupa.

In this and the following species the color is fulvous crossed by fine black lines; beneath, brown suffused with bluish grey, much as in *Vanessa interrogationis*. The apices of primaries are more acute and are distinctly pointed; most obviously so in the present species. The secondaries are broader and the internal margin is somewhat shorter. The present species has the lines above straight, and the 2d and 3d join near anal angle of secondaries.

T. eleuthea, Hb. Saml. Ex. Schmett. II, (*Marpesia*); Doub., and Hew. Gen. D. Lep. II, 363, Atlas t. 33. (*Timetes*); *pellenis* Gdt. Enc. Meth. IX, 359. (*Nymphalis*.)

This species is readily distinguished from the preceeding by the apex of primaries which is not truncate, and by the less emarginate apex of secondaries: the color is darker and the 2d black line is distinctly angulate on the median vein.

Expands 3 inches. *Hab.* Fla., Tex., West Indies.

VICTORINA, *Blanch.*

Body stout, wings large; secondaries with the outer margin very deeply scalloped, and with a short broad tail. Antennæ long, straight and slender, club gradual, with a fine groove at inner side.

A single very large and distinctly marked species is credited to our fauna.

V. Stelenes, L. Syst. Nat. Ed. 10, 465. (*Papilio*); Doub., and Hew. Gen. Diurn. Lep. 2, 265. Atlas pl. 33. (*Victorina*); *Sthenele* Hb. Verz. bek. Schmett. 43. (*Metamorphia*); *Stheneles*, Blanch, Hist. Nat. Ins. 3, 447; (*Victorina*); *lavinia*, Fabr. Ent. Syst. III, 1, p. 22. (*Papilio*.)

Black with a wide band, varying from pale green to pale bluish in color, complete on secondaries, on primaries interrupted at apical half; the primaries have also a more or less complete row of sub-apical large white spots. Beneath the ground color is paler, but the markings are reproduced, the green band being margined with brown on secondaries.

Expands 4 inches. *Hab.* S.W. Tex. and Southward.

HETEROCHROA, *Bd.*

This genus differs from *Limenitis*, so far as I can see, only in the somewhat shorter broad wings; apices of primaries more produced and internal margin of secondaries longer.*

H. bredowii, Hb. Zutr. f. 825. 826, (*Adelpha*); Edw. Butt. N.A. 1, pl. 44, (*Limenitis*); *Eulalia*, Doub. Hew. Gen. Diurn. Lep. t. 36, (*Limenitis*); *californica*, Butler Pr. Zool. Soc. Lond. p. 485.

Easily distinguished by the large subapical fulvous patch of primaries: color black, a white band crossing both wings, angulate beyond the cell on primaries, and gradually narrowing on secondaries to hind angle.

Beneath paler, secondaries dusted with yellow: markings of upper surface reproduced and in addition bands of pale blue and yellow crossing the cell, and a submarginal band of crescents: secondaries with a wide submarginal band, a shade accompanying white band and two transverse bands near base also pale bluish.

Expands 2.5 inches. *Hab.* Cal. Ariz. Or. Mex.

There seems to be no good reason for separating this species from *Limenitis* and it is retained as distinct here only because we have already tabulated that genus.

ACANISTHOS, *Bdl.*

Body very robust, primaries strongly falcate, anal angle of secondaries produced, costal margin strongly arched.

Our only species is:

A. orion, Fabr. Syst. Ent. 485, n. (*Papilio*). Bdl. and Lec., Lep. Am, Sep. t. 195, t. 52. (*Aganisthos*.)

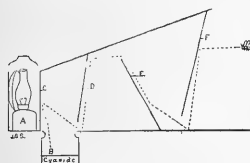
Easily known by the very robust body and by the wing form. Color sordid black, secondaries with a fulvous tinge at base, primaries with base and a spur sometimes nearly attaining the outer margin, fulvous, a white spot on costa near apex. Beneath smoky with paler transverse bands margined with darker lines.

Expands 3-5 inches. *Hab.* Florida (occasional) and Southward.

*That is of course our American species only considered.

Editors Department.

Trap for Heterocera. Many devices for luring and trapping night flying lepidoptera have been tried, with more or less lack of success until most collectors look with suspicion on any but the orthodox modes of procedure. A mode communicated by a friend and said by him to have been successfully used is explained by the annexed diagram. The arrangement consists of a lamp *a*,



backed by a reflector if possible, and as intense as convenient, and throwing its light through a flaring box constructed of wood or other material, the diagram showing a vertical section. The sides flare equally with the top, and the bottom board is flared or not, according to the situation in which the apparatus is to be used: if used on a level ground and not far from the surface, it should not

be flared: in this box are arranged four panes of clear glass as thin as may be, slanted as shown in the figure, *f* and *d* reaching the top and *e* reaching the bottom. Close to the lamp and beneath the last compartment formed by the glass is placed a jar *b* heavily charged with cyanide. The machine acts as follows. It is placed in the woods or elsewhere where the moths may be supposed to abound, and the light shining through the flaring box which by the bye may be whitened inside, attracts all moths that can be so attracted: flying toward the source of attraction they first strike the glass *f* which slants inwardly beneath and does not reach the bottom; the moth will fall to the base board and recovering will move forward striking the glass *e*, which inclines inwardly above and up this incline which should not be too steep, they fly to and through the aperture at the top striking the glass *d* which again slants inwardly beneath and following this slant the moth will find the entrance beneath, and fly against the glass *c* which covers the end of the flare and is nearest to the light; the fumes of the cyanide from the jar *b* will almost immediately overcome the insect and it will drop into the jar placed for its reception. The advantage of this arrangement is that it can be placed outside anywhere and left to itself and it will act as long as the light lasts or the moths fly—it is not possible for an insect to find its way back and the way in is made very easy for it. The dotted line illustrates the probable course of the moth.

Fruit Insects: Mr. Wm. Saunders new book on insects injurious to fruits is at hand and is a volume well worth its price to all fruit growers. The plan is to treat of all the insects affecting each fruit in one chapter, dividing them according to the part of the plant attacked, and giving the modes in which the ravages of each may be checked. It is profusely illustrated, few of the drawings being original while all the old figures which have been used over and over again in text books and agricultural reports may be recognized. Mr. C. V. Riley's well known drawings are largely represented as usual. Little original work has been done by Mr. Saunders for this book, and its value is as a compilation of what has been published heretofore in publications all over the Country. We regret that it is confined to fruit insects alone.

On a gall-making genus of Apioninae.

By Prof. C. V. Riley.

Gall-making Coleoptera are not common and in this country but three are so far recorded, viz. *Ampelogypter sesostris* Lec. and *A. ater* Lec., causing swellings of the stems of *Vitis* and *Ampelopsis* respectively, and *Agrilus ruficollis*, causing swellings of the canes of *rubus*. In Europe several Apioninae are known either to form galls on twigs or nodosities on the roots of plants, and I now wish to record a gall-making species of this subfamily in this country.

A gall-like swelling of the two year old twigs of *Pinus inops* is not uncommon in the vicinity of Washington, and for some time I have been interested in ascertaining the real author, but only succeeded in doing so the present year. As the insect proves to be an undescribed Apionid and Mr. J. B. Smith is at work on the family, I send these notes for publication at his request, and describe the species as *Podapion gallicola*.

The gall is either spherical or ovoid, rarely elongate, and varies from $\frac{1}{4}$ to $\frac{3}{4}$ inch in length. It is usually single but exceptionally there will be two and even three on the same twig and sometimes they coalesce. The surface is somewhat smoother than the unaffected parts of the twig but concolorous; the interior is hard, woody, usually with an abundance of liquid resin. The larva or pupa of the *Podapion* may be found in the month of May in the center of the gall, completely surrounded with the resin, and in an irregular cavity which on one side extends to near the outer surface, probably to facilitate the exit of the imago which takes place late in May and early in June. Those so far reared in captivity have proved to be remarkably short-lived for a Curculionid, dying in half a day. But one develops in each gall.

It has been somewhat difficult to discover the real author of the gall, because of the prevalence of another curculionid larva which inhabits all parts thereof, but especially the outer portion, as many as 15 having been found in a single gall. It produces a *Copturus* which seems to be *C. longulus*, and is evidently inquilineous. It is not infrequently found in the twig immediately above or below the gall. The beetles continue to issue throughout the summer.

The larva of a *Sigalphus* (Braconidæ) is also quite common, and is doubtless parasitic on both the Rynchophora.

As the fresh galls are found only in spring and as the beetle would seem to be short lived, the probabilities are that the egg is laid in the one-year old wood in June, and that either the egg or the larva remains

in the twig without producing the gall till during the short growing season the following year.

The Apioninæ of the United States are remarkable for their generally small size and uniformity of color and structure, the whole subfamily comprising but one genus, *Apion*, showing but slight variation in the relative length of antennal joints and character of tarsal claws. Where such uniformity obtains in a group characters may be considered generic which otherwise would have doubtful generic value. *Podapion gallicola* departs sufficiently both in size and structure from the typical genus to warrant the formation of a new genus for it, which may be thus characterized.

PODAPION, Nov. Gen.

Size large, form cylindric, parallel, elongate; elytral striæ wide; rostrum joining the head abruptly; legs short, robust, femora strongly clavate; tarsi greatly dilated, first joint about as wide as long, second joint transverse; third joint as wide as the length of first and second together, claw joint flattened above, not much projecting beyond the lobes of third joint; claws simple in both sexes.

PODAPION GALLICOLA, N. sp.

Black., opaque, antennæ sometimes piceous, thinly clothed with rather long whitish pubescence. Head broad, nearly square, rugose-punctate, slightly impressed between the eyes which are large, prominent and coarsely granulate, rostrum rather long, slender, equal throughout, moderately curved, more slender and nearly smooth in the female, shorter and sparsely punctulate in the male; antennæ inserted very close to base of rostrum, as long as this last; scape as long as the two following joints together; first joint of funicle wider, but hardly longer than second, the following joints gradually decreasing in length, but none being transverse; club elongate-oval, shining, slightly pubescent. Thorax as wide as long, widest at middle, narrowed and constricted anteriorly, sides rounded, surface moderately finely and densely punctulate, with a very short impressed median line at base. Elytra elongate, sides parallel, striæ wide, finely catenulate-punctate, intervals flat, a little wider than the striæ, finely alutaceous. Ventral surface scabrous and punctulate.

Three specimens from Washington and others from Lake Superior, (Schwarz) and Massachusetts (Leconte) examined. Average length 4 mm.

This is the first *Apionid* recorded as living upon pine trees.

The general aspect of the species is that of a small *Magdalis*, and *M. alutacea* Lec. which also occurs on *Pinus inops* (the larva presumably boring in the terminal twigs) bears a striking resemblance to *Podapion*.

N. M. Hentz' Descriptions of Coleoptera.

(Reprint from Journ. Ac. Phila. 1827, V, 373-375.)

[373.]—*Description of some new species of NORTH AMERICAN INSECTS.*

By N. M. HENTZ, professor of modern languages at the University of North Carolina. Read October 24, 1826.

The insects of which the description follows are rare ; of the four, only one has been found more than once by myself, and the others were unknown to several studious entomologists, which is an additional consideration for supposing them to be new.

BUPRESTIS.

B. harrissi. Green ; eyes black ; antennæ black towards the extremity ; tarsi black ; elytra with two impressions near the base, the internal one uniting with a groove, which follows the suture.

Description.—*Body* bright green, punctured : *head* punctured : *eyes* black : *antennae* black, tinged with green near the base : *thorax* green, punctured with a longitudinal impressed line : *elytra* with a deep impression at the base, divided in two by a nearly obsolete raised line ; a raised line, forming, with the suture, a deep groove, which terminates at the apex ; an impression nearer the apex than the middle, formed by the termination of the obsolete line ; a diagonal raised line, and another near the margin ; in all four raised lines : *pectus*, *postpectus*, and *venter* green, punctured : *feet* green : *anterior thighs* with a large tooth : *tarsi* nearly black.

Length accompanies the drawing. Fig. 1. [9 mm.]

[374.] *Observations.*—Found in the month of May, in Massachusetts.

ELATER.

E. vernalis Bright, black, elytra yellow, striate, with five bluish-black spots, one common at the base.

Description.—*Body* bright black, punctured ; *antennae* black ; *head* and *thorax* black, punctured : *elytra* yellow, with striæ formed by punctures, each having three bluish-black spots, of which one at the base is common with the other : *pectus*, *postpectus* and *venter* black, punctured : *feet* black ; *tarsi* rufous near the extremity.

Length accompanies the drawing. Fig. 2. [10 mm.]

Observations.—This insect, found in May, in the west of Pennsylvania, was new to Mr. Say. Dr. Harris, and all the other entomologists whom I consulted.

AMPHICOMA.

A. vulpina. Piceous : thorax, scutel and abdomen, covered with yellow hair; elytra brownish.

Description.—*Head* nearly black, punctured; *antennae* piceous; *thorax* and *scutel* nearly black, punctured, covered with thick yellow hair; *elytra* brown, turning to a chesnut colour; somewhat darker near the apex; *venter* piceous, covered with yellowish hair, thicker on the sides; *feet* nearly black; *tarsi* piceous.

Length accompanies the drawing. Fig. 3. [15 mm.]

Observations.—The discovery of an insect of this [375]genus, in this country, is peculiarly interesting, as there were reasons for supposing it to be confined to tropical regions. To my friend, Dr. T. W. Harris, of Milton, Mass., I am indebted for useful remarks on this insects, which I submitted to his examination. It was found in June, in the west of Massachusetts, resting on flowers; it flies very much like *CETONIA barbata* of Say, and, like it, visits the ground frequently.

NOTOXUS.

N. anchora. Testaceous; horn of the thorax brown at the apex; a black line on the suture of the elytra, reaching a black transverse spot near the apex; a small longitudinal black line nearer the base on the sides.

Description.—*Body* above slightly hairy, testaceous; *head* fuscous; *eyes* black; *thorax* testaceous; *horn* slightly dentate, fuscous chiefly on the sides, the shade continued to the sides of the thorax; *elytra* with a black suture, broadest near the base, not reaching the apex, but united to a large, black, lunate, transverse spot; a black, abbreviated, longitudinal line near the external margin, above the transverse spot, and nearly reaching it; *feet* testaceous.

Length accompanies the drawing. Fig. 4. [5 mm.]

Observations.—This beautiful insect is allied to *ANTHICUS monoceros* as well as *ANTHICUS monodon*, described by Mr. Say, but sufficiently distinct from either. I have, as yet, found but two specimens, in the month of July, in Massachusetts.

SYNOPSIS OF BUTTERFLIES.

“**VANESSA**, Fabr. group *GRAPTA*, Kirby.”

In March, number 11 of the Bulletin, we gave a synopsis of *Vanessa* Fabr. The species enumerated here, generally known as *Grapta*, form but a sub group of the former, and are therefore now embodied as such in that genus. The palpi of *Grapta* are not so heavily clothed with hair, and the wings are generally more falcate, and have deeper indentations; the ground color is fulvous or red-fulvous, with paler and darker shadings and black markings; on the underside of secondaries the median field encloses a marking resembling either a comma or a semi-colon; in all but one species this mark is silvered.

They can be separated as follows:

Ground color yellow fulvous; black markings very heavy; white patch at apices of wings; comma of underside of secondaries dirty white, not silvered.....**J. Album.**

Ground color bright fulvous; borders blackish.

Black markings slight; secondaries dark; comma on underside of secondaries silvered and bent, the lower limb small.....**Progne.**

Black markings slight; secondaries same color as primaries; a prominent whitish band runs through both wings on underside; comma moderate and silvered....

Gracilis.

Black markings heavy; borders very broad; underside mottled with green and white; comma often large, angular, silvered, and barbed at each end; sometimes small and pointed at the ends.....**Faunus.**

Black markings heavy and borders broad; underside almost black, with a few light irrorations; comma large, angular and silvered, both limbs pointed and of about equal length, the upper one slightly curved.....**Silenus.**

Red-fulvous with the usual black spots; underside brown variegated with paler and darker shadings; comma silver, narrow, bent at right angle and pointed at each end.....**Oreas.**

Rather light fulvous with markings not very heavy; underside marbled in shades of gray, brown, and black; discal mark a fine bent silvered streak, the upper limb curved, the lower straight and the two equal in length.....**Hylas.**

Black markings rather slight; borders broad; underside mottled brown, green and whitish; comma silvered, angular, roughly barbed at upper end, thickened and blunt at lower end.....**Rusticus.**

Ground color yellow-fusous, brighter on disks.

Borders ferruginous brown, narrow on primaries, broad on secondaries; discal mark silvered and bent, the upper limb slender, the lower one thick and barbed.....**Silvius.**

Borders, brownish black on primaries, much paler on secondaries; comma moderate bent and silvered.....**Zephyrus.**

Black markings slight; borders of primaries narrow and brownish black, growing lighter towards apex and inner angle, of secondaries pale yellow fulvous with submarginal line of red-fulvous; discal mark large and silvered, the lower limb sometimes barbed; anal angle very much produced. **Satyrus.**

Ground color bright fulvous; markings slight; borders of primaries blackish, of secondaries deep ferruginous, fringed with bluish-gray; comma rather large and silvered, the ends sometimes slightly barbed **Comma.**

Ground color bright red-fulvous; borders deep red-ferruginous, edged with blue; underside either uniform pale brown with few markings, or brown, mottled with lighter and darker shadings; discal mark double, in shape of a semi-colon, and silvered. **Interrogationis.**

J. Album, Bdv. Bd. Lec. 185, pl. 50. Morr. 56. Harris Ins. Inj. Veg. 298. Lint. Proc. Ent. Soc. Phil. III, 58.

Can be easily known by its large size, the heavy black markings, and the wide patch at apex of both primaries and secondaries; comma on underside of secondaries dirty white.

Hab.—Nor. States, Wisc., British America to Pacific, Can., Labr.

Expanse $2\frac{3}{8}$ to $2\frac{3}{4}$ inches. Larva on species of willow.

Progne, Cram. Pap. Ex., I, pl. 5. Bd. Lec. 188, pl. 50. Morr. 56. Harris Ins. Inj. Veg. 301. Lint. Pr. E. S. Phil. 3, 58.

Bright fulvous with black borders to both wings; secondaries heavily sprinkled with black scales, with a row of submarginal light fulvous spots; usual black markings very light; underside brown, variegated with paler shadings.

Hab.—No. and W. States, British America, Can., Nova Scotia, Anticosti. Expanse 2 to $2\frac{1}{4}$ inches.

The larva is described in Harris' Ins. Inj. Veg. Food plants, elms and hops.

Gracilis, G. and R. Ann. N. Y. Lyc. N. Hist. 8, 432. Strecker, pl. 8, fig. 14.

A small species; fulvous with slight black markings; underside brown with lighter shadings, and a distinct median whitish band running through both wings, which will readily serve to identify the species.

Hab.—New Hampshire, W. M., Br. Am., Quebec, Alaska,

Expanse about $1\frac{5}{8}$ inches.

Faunus, W. H. Ed., Pr. Ac. N. Sc. Ph. 1862, 222, Ed. Butt. N. A. 197, pl. 35, Pearson, Can. Ent. 7, 49.

Is easily distinguished by the deep indentations of the wings, the heavy black markings and broad borders, and the general darker appearance of underside mottled with green and white.

Hab.—Mountains of New England and N. Y.; occasional W. Va. to Georgia, British America, Atlantic to Pacific.

Expanse 2 to 2½ inches. Larva on willow.

Silenus, W. H. Edw. Edw. l. c. 3, 15. Edw. Butt. N. A. 2. pl. 10, Grapta.

Deep fulvous, with heavy black markings; on disk of secondaries one large irregular black patch; underside very dark, with lighter irroration, especially on primaries.

Hab.—Oregon, Vanc. Isld, Wash. Ter. Expanse 2 to 2.3 inches.

Oreas, W. H. Ed., Tr. A. E. Soc., 373, id. 5, 109.

Light red fulvous, with a row of large yellowish lunules; secondaries with borders diffuse, enclosing a row of yellowish lunules; underside dark brown, shaded and streaked with brown and black.

Hab.—California, Oregon.

Hylas, W. H. Edw. Tr. A. E. Soc. 4. 68. Ed. Butt. N. A. 2, pl. 2, Grapta, Mead, Wh. Rep. 5, 768.

Primaries deeply incised; black markings rather heavy, underside marbled in shades of gray, brown, and black.

Hab.—Colorado. Expanse 1¾ inches.

Rusticus, W. H. Edw. Tr. A. E. Soc., 5, 107. Ed. Butt. N. A. 2. pl. 2 Grapta.

Dull red-fulvous with broad borders; black markings rather slight; underside mottled in shades of brown and greenish gray.

Hab.—California, Vanc. Isld. Expanse 1.9 inches.

Silvius, W. H. Edw. Tr. A. E. Soc., 5, 108.

Yellow-fuscon, bright red on disks; borders ferruginous brown, narrow on primaries, broad on secondaries, followed by a row of yellow lunules; underside yellowish, streaked with brown markings.

Hab.—California. Expanse 1.9 inches.

Zephyrus, W. H. Edw. Tr. A. E. Soc. 3. 16. Edw. Butt. N. A. I, 121, pl. 40, H. Edw. Pr. Cal. Ac. N. Sc. 5, 169, Mead, Wh. Rep. 5, 769.

Red-fulvous, or fulvous, with yellowish markings towards the outer edges; margin of primaries dark, of secondaries pale fulvous, inclining to gray, with marginal and submarginal bands of deep red-fulvous, often disconnected; underside gray or gray-brown, with lighter shadings.

Hab.—Montana to N. Mex., Utah, California, Colorado, Oregon.

Expanse 1¾ to 2 inches. The larva is figured and described in Edw. Butt. N. A. I, 121, pl. 40, food plant "Azalia occidentalis".

Satyrus, W. H. E. Tr. A. E. Soc. 2. 374. Edw. Butt. N. A. 1, 119, pl. 40. H. Edw. Pr. Cal. Ac. N. S., 5. 168. Pearson, Can. Ent. 7, 216, Mead, R. Wh. Exp. 5, 767.

Pale fulvous with slight black markings; margins of secondaries usually pale, often inclining to yellow, with a disconnected submarginal band of deep fulvous; the wings are only moderately incised, and this with the rather long tail and produced anal angle will serve to easily distinguish the species.

Hab.—Colorado to California; New Mexico, Oregon, British America, Ontario. Expanse about 2 inches.

Mr. W. H. Edwards figures the larva in his Butt. N. A. I, 119, p. 40, and adds that it feeds on nettles.

Var. Marsyas, W. H. Edw. Tr. A. E. Soc. 3. 16. Ed. Butt. N. A. pl. 2, Grapta, id. 1879, 2, part 8, plate 3.

Fulvous with slight black markings; the marginal borders of secondaries ferruginous, much sprinkled with yellow scales; the comma on underside of secondaries is silvered, thickened at upper end, barbed at lower end; underside shaded brown and olivaceous. The produced anal angle, so noticeable in *Satyrus* seems to be lost in this form.

Hab.—California. Expanse 1.6 inches.

In the last mentioned reference above, Mr. W. H. Edwards records that Mr. O. T. Baron of Navarro, Cal., had by breeding established the fact that *Marsyas* is seasonally dimorphic with *Satyrus* and adds the figure of an interesting suffused specimen obtained from the brood, without however giving any information about the larva.

Comma, Harr. Harris Ins. inj. Veg. 300, pl. 4, fig. 1, Lint. Pr. E. S. Phil. 3, 55. Ed. Butt. N. A., 1.99, pl. 36.

Bright fulvous, with rather slight black markings; borders of primaries narrow and black, of secondaries deep ferruginous, fringed with bluish-gray; underside generally brown, mottled with lighter and darker shadings, but one form has the underside dark slate color, irrigated with brown markings. *Hab.*—Eastern, Middle, and North Western States, Kansas, Texas, Canada, Nova, Scotia. Expanse $1\frac{3}{4}$ to 2 inches.

In *Harris* the larva is described as being very like *Interrogationis*; one form corresponds to this, but another ranges from pale green to snow white with various red markings, and having the spines tipped with black; on several occasions we have seen both *Comma* and *Dryas* emerge from chrysalids obtained from almost snow-white caterpillars. Food plants hops, elm, and nettle.

Mr. W. H. Edwards figures and describes the caterpillars in his Butt. N. A. 1, 99, pl. 36 and 1, 107, pl. 37.

Var. Dryas, W. H. Edw. Tr. A. E. Soc. 3, 17. Ed. Butt. N. A. 1, 107, pl. 37.

Upper surface of secondaries almost entirely blackish, with small sub-marginal pale fulvous spots, growing fainter and disappearing towards anal angle.

Expanse same as Comma.

Interrogationis, Fabr. Ent. Syst. Sup. 424, Harr. Ins. Jnj. Veg. 298, pl. 124. Ed. Tr. A. E. Soc. 35. Butt. N. A. 1, 113, pl. 39.

Can be easily distinguished by its large size, the very falcate wings, the bright red-fulvous color, and the decided, blue fringes; underside generally uniform pale brown with but few markings; discal mark double, in shape of a semi-colon, and silvered.

Description of the larva and chrysalis will be found in Harris Ins. inj. Veg. p. 293, also in Ed. Butt. N. A. 1, 113, pl. 39. Food plants hops, elm, and nettles.

Hab.—United States, except Pacific, Can. N. S.

Expanse $2\frac{1}{2}$ to $2\frac{3}{4}$ inches.

Var. Umbrosa, Lintner. Tr. A. E. Soc. 2, 213. Ed. Butt. N. A. 109, pl. 38.

Upperside of secondaries almost entirely black, except at base; underside brown, mottled with lighter and darker shadings, and some few bluish spots and streaks.

Arctia Nais and Variations.

By George D. Hulst, D. D.

On the 9th day of June while looking among the rubbish washed upon the beach at Rockaway, L. I., I found three specimens of what was afterwards determined as *Arctia excelsa* Neum. All the specimens were females. One was dead, the other two almost dead by the buffetings of the waters. One revived enough to lay a few eggs which were carried through to imagines. The eggs were white slightly flattened, were laid June 10th and the larvæ emerged June 16th. When first emerged the larvæ were white and clothed with loose long silky hair. After the first moult the hair became, while long and *Spilosoma* like, nearly black and so continued until the fourth moult. After that the hair became short rigid and arctian and the larvæ were jet black with the exception of a narrow orange dorsal stripe on the body of some. On some also the hair laterally was somewhat reddish. The larva made

cocoon July 18th and emerged Aug. 11th. The larvæ were feed entirely upon the common broad leaved plantain (*Plantago major*).

From the caterpillars I had 12 imagines, and these showed some very remarkable variations. The fore wings ranged with a bareness of marking nearly equal to *A. decorata* through the *F* form to the full marking of the wing with the outer *W*. The hind wings varied even more, in one specimen they are entirely black and from that they ranged through *A. excelsa* to the most fully marked *A. figurata*.

The coloration of the bodies as well varied greatly. The darker the kind wings were in the main the darker were the markings of the body. But this was only a tendency. In one the body was entirely black, and from that through dorsal and lateral markings the color extended to a full red laterally and to red with scarcely perceptible black spots dorsally. Beneath on abdomen the color was uniformly black. The thorax varied comparatively little in amount of coloration while the color of the legs scarcely varied at all.

In my own and other collections there exist all possible intergrades in the markings of both the fore and hind wings, the latter running through yellow and red and from the solid band of black through black spots of every form and size to wings almost unspotted at all with black.

Prof. French of Carbondalle Ill. has by breeding established the identity of *Arctia nais* Dru., with *A. phyllira* Dru. and *A. Phalerata* Harr. And he only doubts the identity of *A. decorata* Saund., because the larvæ differed slightly. The larva raised by me from eggs of *A. excelsa* covered the likeness of the larvæ of *A. nais* and *decorata* as given by Prof. French.

Acting on all these facts we are justified in bringing together a great number of what have hitherto been called species as being only varieties or variations of one species. So far as the facts justify the synonymy stands as follows.

<i>ARCTIA NAIS</i> Dru.	<i>Snowi</i> Grote.	<i>decorata</i> Saun.
<i>Phalerata</i> Harr.	<i>phyllira</i> Dru.	<i>flammea</i> Neum.
<i>F. pallida</i> Streck.	<i>figurata</i> Dru.	<i>excelsa</i> Neum.
<i>celia</i> Saun.	<i>placenta</i> Abb. & Sm.	

It seems to me that *A. Blakei* Grote, *superba* Stretch, *Bolanderi* Stretch and *determinata* Neum. must be included under this very variable species. And there may also be others with which I am acquainted only by description. To the above I add the following notes. I raised last year the larvæ of *A. virgo*. The larvæ varied somewhat, the most having

reddish lateral line while some were all black. The imagines also varied appearing with 3, 2, 1, and no transverse bars reaching from median longitudinal bar to costa. The secondaries also varied much in the amount of black upon them. The other day I saw in the collection of Mr. Geo. Franck of Brooklyn two females of this species with yellow instead of red on hind wings and with a marginal unbroken black band thus corresponding to Variety *Celia* of *figurata*.

I also last year raised *A. Parthenice* Kirby. The larvæ were black with lateral reddish band just like the most of the larvæ of *A. Virgo* and showed very little variation. But there was very considerable variation in the imagines. The transverse bars were lost in some and the longitudinal lines very much reduced. One had the hind wings more than two thirds black. This in connection with one even darker in Mr. Franck's collection give sufficiently the intergrades between *A. Parthenice* and *A. Anna* Grote, to show to a certainty that the last has not specific standing. Lest there may be a misapprehension it will be understood that I look upon *A. Parthenice* Kirby, as the same insect as *A. Saundersii* Grote. Kirby's description by Mr. Grote's acknowledgement is better fitted to *Saundersii* than *Virgo*. And Kirby surely must have been acquainted with *Virgo* in nature. The insect stands.

ARCTIA PARTHENICE Kirby. *Saundersii* Grote. *Var. Anna* Grote.

List of Carabidae found in the neighborhood of New York City.

(Continued from page 29—32.)

Helluomorpha ferruginea Lec. June, Sept. Under logs in Green-ville; rare.

Brachynus. March to Oct. Under stones, stumps, moss etc., usually near moist places, sometimes in large numbers. As far as could be ascertained without a synoptic table, the following species are found here: *viridipennis* Dej.; *minutus* Harr.; *perplexus* Dej.; *quadripennis* Dej.; *conformis* Dej.; *cyanipennis* Dej.; *alternans* Dej.; *fumans* Fab.; *similis* Lec.; *cordicollis* Dej.; *medius* Lec.

Chlaenius. The species of this genus are found in moist places under stones, with the exception of *tomentosus* Say, which is usually found in dry pastures. Early in spring at the foot of the Pallisades behind Hoboken, are found *niger* Rand; *impunctifrons* Say; *pennsylvanicus* Say; *tricolor* Dej.; *nemoralis* Say; *diffinis* Chaud.; at the same locality, but

also on Fort Lee, Snake Hill, Ridgewood, N. J., and Jamaica woods L. I. during the whole season: *laticollis* Say; *aestivus* Say; *sericeus* Forst.

Anomoglossus emarginatus Say. May to Oct. Under stones in woods, Fort Lee, Ridgewood, and Jamaica; *pusillus* Say, May to Sept., near hedges, in fields Long Island, New Jersey.

Brachylobus lithophilus Say. Early in spring behind Hoboken at the foot of the Pallisades on moist places under stones.

Lachnocrepis parallelus Say. June. Under stones near a pond in Ridgewood L. I., rare.

Oodes americanus Dej. (*fluvialis* Lec.) May and June, common with *Brachylobus*; *amaroides* Dej., rare, at the same locality; also with *Lachnocrepis*.

Geopinus incrasatus Dej. May to Sept. On sandy places under boards, cow-manure often six inches deep in the sand, Greenville, Coney Island, Rockaway.

Cratacanthus dubius Beaur. June and July, at Coney Island's shore.

Agonoderus lineola Fab.; *pallipes* Fab.; *pariarius* Say; *indistinctus* Dej.; during the whole season under stones, the first three very common, the fourth very rare.

Gynandropus hylacis Say. May, June. Behind Hoboken gas-house under the bark of trees.

Harpalus erraticus Say. May to Sept. On sand near the canal in Greenville at Passaic; *viridaeneus* Beauv, in the streets and around the city, mostly running; *nitidulus* Chaud., on Coney Island; *dichrous* Dej.; *vulpeculus* Say, and *autumnalis* Say, in the woods near Jamaica, East New York, and the species of *caliginosus* Fab.; *faunus* Say; *vagans* Lec., *compar* Lec.; *erythropus* Dej.; *spadiceus* Dej.; *pleuriticus* Kirby, common everywhere under stones the whole season.

Selenophorus opalinus Lec. June. Jamaica woods, rare; *gagatinus* Dej., on Coney Island; *pedicularius* Dej., and *ellipticus* Dej. are reported from here, but my specimens are all from Tex. and Fla.

Acupalpus carus Lec. Found here but no special locality is recorded.

Bradycellus cognatus Payk, rare; *rupestris* Say, common.

Tachycellus atrimediis Say; *badipennis* Hald.

Anisodactylus rusticus Say; *agricola* Say; *Harrisii* Lec.; *nigerimus* Dej.; *nigrita* Dej.; *discoideus* Dej.; *baltimorensis* Say; *coenus* Say; *sericeus* Harris; (*Xestonotus*) *lugubris* Dej.; (*Amphasia*) *interstitialis* Say.

Spongopus verticalis Lec. **Anisotarsus terminatus** Say.

SYNOPTIC TABLES OF COLEOPTERA.

CICINDELIDÆ.

By F. G. Schaupp.

Having by predilection during the last few years devoted much time in collecting the species of this family, I have always felt the want of a complete treatise on this subject.

Since Say's Monograph on Cicindelæ (1817) in which he enumerated but fifteen species, Dr. Leconte published his Revision of the Cicindelæ of the United States (1856) treating sixty-five species, the two papers being on Cicindela alone.

It is difficult to obtain the latter paper, incomplete as it has become by the recent publications of new species and by the discovery that many enumerated therein are but varieties or races. Hence the time seems opportune for the publication of a newly revised work in which all the species now known will appear.

I do not, however, in the present paper, pretend to present a thoroughly exhaustive scientific treatise, but rather a concise, plain guide such as I myself have felt the need of.

I have availed myself of every printed, written and oral communication accessible to me to make the work as complete as possible, and I take this opportunity to express my thanks to all those, who have aided me by furnishing dates or specimens.

CICINDELIDÆ.

Antennæ filiform, 11 jointed, inserted on the front above the base of the mandibles, which are long and sharply toothed, hind coxæ mobile and simple, abdomen of female 6-articulate, of male usually 7-articulate.

We have four genera.

Posterior coxæ separated, eyes small.

Sides of the elytra widely inflexed..... *Amblychila*.

Sides of the elytra narrowly inflexed..... *Omus*.

Posterior coxæ contiguous, eyes large prominent.

Third joint of maxillary palpi longer than the fourth..... *Tetracha*.

Third joint of maxillary palpi shorter than the fourth..... *Cicindela*.

AMBLYCHILA Say.

(Greek : amblys—obtuse, and cheilos—labrum.)

A. cylindriformis, Say, (fig. 1.)—Black, elytra brown ; head large, eyes small ; labial palpi shorter than maxillary, with the first joint concealed under the mentum, the third and fourth elongate ; mandibles with 3 teeth ; labrum bidentate at middle ; thorax and underside smooth ; elytra oval with three carinæ at each side and irregular, unequal punctures ; legs long and robust ; tarsi short. Wingless. Length 35–38 mm.

♂.—Hind trochanters acute with two grooves : dense yellow brushes near the two tibial spurs of the middle legs ; last ventral segment broadly rounded with large setigerous punctures on each side of the middle ; pygidium small.

♀.—Hind trochanters shorter, oval, obtuse at tip ; last ventral segment somewhat prominent in middle, and sinuate at each side, with a feeble median longitudinal impression ; pygidium very large.

The larva, (fig. 121,) has been fully described by Dr. G. H. Horn, Trans. Am. Ent. Soc. vii, p. 29.—It is yellowish-white, head and thoracic scutes castaneous, differs by the numbers of eyes (but two) and the length of the joints of antennæ and palpi from the larvæ of *Omus*, *Tetracha*, and *Cicindela*. Antennæ with joint two nearly equal to all the others combined ; maxillary palpi with the first joint longest, third shortest. Length 32 mm, in normal position ; 44.5 mm, when extended.

Since the time of its description by Say, (1823) this insect has been very rare, but during the last few years it has been found quite abundantly in Kansas by Messrs. H. A. Brous, Prof. F. H. Snow, and by my friend, the late George T. Cooper.

It lives in holes made in the clayey banks of ravines, is nocturnal in its habits, and moves around in a peculiar way, raising its body very high and keeping its antennæ in constant motion. Its sight is very poor.

Habitat.—Western Kansas, Colorado, Arkansas, Indian Territory, N. Mexico, Eastern Arizona, Texas. June, July, August.

Say, Journ. Ac. Phil. 1822, iii. 139 ; Trans. Am. Phil., new ser., iv, 409 (emend.) ; Thoms., Mon. p. 14, pl. 3, fig. 3.—Lec. Col. of Kans., p. 1. pl. 2, fig. 1 ; Horn, Trans. Am. Ent. Soc., v. 233, (on sexual characters, etc.) ; Trans. Am. Ent. Soc., vii, 28 (on the larva).

Amblychila Piccolomini Reiche. Ann. Tr. 1838, pl. 19, f. 1–6 is merely a smoother *A. cylindriformis* with a wrong locality.

OMUS, Esch.

(Omus—Cruel.)

Black, more or less opaque (one submetallic), wingless, head nearly square, eyes small, palpi of equal length, the labial with the first joint very short, third long; antennæ inserted in front under a prolongation before the eyes; mandibles very long, acute, the right with two teeth, the left with three; thorax flattened; elytra convex; legs stout, short.

♂.—Has the three joints of anterior tarsi dilated (more inwards) and densely spongy beneath; last ventral segment deeply emarginate at the middle.

♀.—Has the last ventral segment oval at tip and entire.

The larva, fig. 122, described by Dr. Horn. l. c. p. 31, is yellowish-white; head piceous; prothoracic scute pale castaneous; has eight eyes, two pairs large, two pairs small; antennæ with the first three joints equal, fourth shorter; maxillary palpi with joints one and three equal, second shorter. Length in normal flexed position, 20 mm.

This genus is also nocturnal, found on the Pacific Slope from Vancouver Island to Monterey Co., California. They hide under pieces of wood and may easily be baited by placing finely chopped meat near small pieces of board, under which they can be found the next day.

Horn, Trans. Am. Ent. Soc., v. 234, (on sexual characters); Trans. Am. Ent. Soc., vii. 31, (description of the larva of *Omus Dejeanii*), Hy. Edwards, Psyche, i, 73, (on the localities and habits of *Omus*.)

TABLE OF OMUS.

I.—Lateral margin of thorax obliterated posteriorly, not attaining basal margin.

Surface black.

Thoracic margin distinctly reflexed.

Elytra foveolate and opaque.....*Dejeanii*.

Elytra simply punctate and shining.....*Edwardsii*.

Thoracic margin extremely feeble.

Elytra rather irregularly punctate.....*Audouinii*.

Surface bronzed.

Elytra broadest near the apex, form nearly parallel.....*submetallicus*.

II.—Lateral margin of the thorax attaining the basal margin.

Elytra moderately coarsely punctured.

Thorax nearly square.....*Hornii*.

Thorax narrowed behind, rugulose.....*californicus*.

Thorax narrowed behind, comparatively smooth.

Form robust, labrum bisinuate.....*sequoiarum*.

Form slender, labrum nearly truncate.....*Lecontei*.

Entire surface smooth, impunctured.....*lævis*.

1. **O. Dejeanii**, Reiche, (fig. 2.)—Our largest species, easily distinguished by the deep irregular foveæ of the elytra. Length 15–20 mm.

Habitat.—Vancouver Island, Northern California, Oregon and Montana. April to July, common.

Reiche, Ann. Fr. 1838, p. 299; pl. 10, fig. 1; Thoms. Mon., p. 15, pl. 3, fig. 4. Lec. P. R. R. Exp., 47 Par., p. 27, pl. 1, f. 1. H. Edwards, Psyche, i, p. 73.

2. **O. Edwardsii**, Crotch, (fig. 3.)—Resembles Dejeanii, but is without the foveæ, much smoother. Length 14–18 mm.

Habitat.—Near Lake Tahoe, Cal. June: August. Quite rare.

Crotch, Trans. Am. Ent. Soc., v, p. 73; H. Edwards, l. c.

3. **O. Audouinii**, Reiche, (fig. 4.)—The thorax less deeply wrinkled, the disc and apical margin nearly smooth, and the punctures of the elytra more unequal. Length 13 to 18 mm.

Habitat.—Foot-hills and mountains of California, Oregon, Washington Territory and Vancouver Island. June to August. Very common.

Reiche, Ann. Fr. 1838, p. 300, pl. 10, fig. 2; Thoms. Mon. pl. 3, figs. 7, 8. Lec. P. R. R. Exp., p. 27, pl. 1, fig. 2; H. Edwards, l. c.

4. **O. submetallicus**, Horn, (fig. 5.)—A species very distinct by its bronze color, its more elongate and cylindrical form, and the shape of the elytra. Length 13.5 mm. Only one specimen known: in H. Ulke's collection in Washington.

Habitat.—Eldorado, Co., Cal. June.

Horn, Trans. Am. Ent. Soc., 1872, p.; Hy. Edwards, l. c.

5. **O. Hornii**, Lec., (fig. 6.)—Has the thorax less narrowed behind than any other species, elytra rather broadly ovate, much rounded at the sides. Length 16.5 mm. But one specimen known. Coll. Dr. Leconte.

Habitat.—Yosemite, Cal.

Lec. Trans. Am. Ent. Soc., v. p. 157; Hy. Edwards, l. c.

6. **O. californicus**, Esch., (fig. 7.)—Has the thorax very deeply rugose, which looks therefore more opaque, and may by this character be easily distinguished. Length 14 to 16 mm.

Habitat.—California, west of Sierra Nevada, southwards to Monterey Co. Found near San Francisco by Hy. Edwards. April to May. Common.

Eschh., Atl. i, p. 4, pl. 4, fig. 1; Thoms., l. c., p. 16, pl. 3, figs. 5, 6; Lacordaire. Gen. Atl. i, pl. 1, fig. 1; Lec., P. R. R., p. 27, pl. 1, fig. 3; Hy. Edwards, l. c.

7. **O. sequoiarum**, Crotch; (fig. 8.)—Closely allied to californicus, but longer, broader and stouter; sides of thorax more rounded; elytra broader and more convex. Length 18 mm.

Habitat.—Sierra Nevada near Calaveras, Cal. June to August.

Rare.

Crotch, Trans. Am. Ent. Soc., v. p. 73.

8. *O. Lecontei*, Horn, (fig. 9.)—Easily known by the form of the elytra, having the greatest width in front of the middle, and behind this point becoming gradually narrower and less arcuate. Length 16 mm.

Habitat.—Near Monterey, also Mariposa, Cal. June to July,

Rare.

Horn, Trans. Am. Ent. Soc., iv, p. 143.

9. *O. laevis*, Horn, (fig. 10.)—Differs from all the others of the genus in being almost entirely smooth and sub-opaque; the elytra are regularly oval, exhibiting a few almost obsolete punctures irregularly placed like the foveæ in *Dejeanii*. The whole surface is very finely alutaceous, causing the sub-opaque appearance. Length 17 mm. Only in Dr. Horn's and Leconte's collections. 2 specimens, ♂ and ♀.

Habitat.—High Sierras near the head waters of King's and Tule Rivers. June.

Horn, Proc. Ac. Nat. Soc. 1866, p. 394.

TETRACHA Hope.

(Quadrifariam.)

Large, metallic green species which are winged but do not fly.

Head large, eyes circular, large; labial palpi longer than maxillary, with the first joint elongated; third joint of maxillary longer than the fourth; mandibles with four teeth; labrum without tooth; thorax broader than long; elytra subparallel, slightly convex, broader than the base of the thorax, deeply punctulate; scutellum not visible; a large triangular impression at the middle of the thorax.

♂.—Anterior tarsi dilated as in *Omus*; last ventral segment triangularly emarginate; tip of elytra subtruncate; sutural angle rectangular.

♀.—Last ventral segment broadly oval at tip; tip of each elytron rounded; sutural angle obliterated.

The larva, (fig. 133) also described by Dr. Horn, l. c., p. 34, is yellowish-white; head and thorax corneous with metallic surface; the margin of the latter testaceous; the eyes as in *Omus*. Antennæ with second joint longer than the first and equal to the two following together. Maxillary palpi with the second and third joints nearly equal, each slightly longer than the first. Length 17 mm.

This genus is represented in the United States by two species, which are also nocturnal in their habits. They hide during day-time under chips, and are found from Philadelphia southward in every Atlantic and Gulf State.

Tetracha carolina, Lin. (fig. 11.)—Light gold-green, tip of abdomen, apical lunule of the elytra, legs and antennæ luteous; thorax smooth: elytra coarsely punctured, at the middle purple and the margin bright green. Length 20 mm.

Habitat.—Georgia, Louisiana, Florida, Texas, and Lower California.

Lin. Syst. nat., ii, 1735, p. 567; Dej., Spec. i, p. 8; Thomson, l. c. p. 30; Horn, Trans. Am. Ent. Soc., v, p. 234, (sex. char.) About a dozen varieties of this species are described from Mexico, Cuba, Brazil, Chili, Peru.

Tetracha virginica, Lin. (fig. 12.)—Dark gold-green, last ventral segment and antennæ ferrugineous; thorax smooth; elytra much coarser punctured than *T. carolina*; broad lateral margin of thorax and elytra metallic-green, middle black: without lunule. Length 20-24 mm.

Habitat.—With the preceding, Texas, Louisiana, Florida, Nebraska, Pennsylvania.

Lin., Syst. Nat. I, ii, 1735, p. 567; Thoms., l. c. p. 41, pl. 7, fig. 7; *virginata* Lin. Syst. Nat. (Gmelin) I, iv, p. 1922; Horn, Trans. Am. Ent. Soc., v, p. 234, (sexual characters.)

CICINDELA.

Usually shining, bright colored species; head large with prominent eyes. Thorax narrower than the head, legs long and slender. The species of this genus live with a few exception on sandy places or roads flying around as long as the sun is shining. They fly up on the least alarm, but soon alight a few paces distant; during night and rainy days they hide in holes which they have dug in the sand.

The larvæ live in holes from 6 to 18 inches deep, made by preference in sloping ground from which they are easily extracted by introducing a fine straw or grass down the holes to which they will cling tenaciously.

We may tabulate our species as follows.

Humeral angles wanting, species either wingless or with aborted wings....1st Division.
Humeral angles distinct, winged species.

Underside unicolorous black, blue or green.....2nd Division.

Underside unicolorous, but the hind trochanters rufous.....3rd Division.

Underside partly rufous.....4th Division.

FIRST DIVISION.

Humeral angles wanting.

Wingless, surface immaculate greyish black with some green punctures near the suture of the elytra. *Filatei*, Guer

Black without green punctures *Belfragii* Salle.

With aborted wings, sericeous brown with imperfect white markings.

celeripes, Lec.

Elytra less deeply punctured *cursitans* Lec.

SECOND DIVISION.

Humeral angles distinct, winged species. Underside metallic green or blue, sometimes black; hind trochanters of the same colors; elytra of male and female equally shaped.

GROUP I.

Thorax flattened, preceptibly margined, trapezoidal, front glabrous; palpi black, elytra flattened, tip not serrate.

Elytra punctured only towards the base, black without or with faint white markings, body beneath black. *obsoleta*, Say.

Black with normal markings *vulturina* Lec.; elytra olivaceous dull green, immaculate, underside metallic green *prasina* Lec.

Elytra foveate and punctured.

Front flat, labrum three toothed, surface dull brown; elytra with a marginal dot and cyaneous punctures, underside glabrous. *unipunctata*, Fab.

Front excavated, labrum one toothed; surface dull brown or black, elytra with humeral, posthumeral and ante apical dots and a reclivate nearly transverse narrow middle band, underside hairy. *longilabris*, Say.

Black, more shining and with more deeply punctured elytra *montana* Lec. green above with complete humeral lunule *perviridis* Schaupp.

GROUP 2.

Thorax convex, not margined, narrowed behind; front hairy, palpi black; elytra convex.

Marginal markings.

Elytra indistinctly punctured with a row of small shallow foveæ near the suture.

Thorax not granulate, hardly rugose, surface not polished; pectus and legs sparsely clothed with white erect hairs, outer side of middle tibiae densely pubescent, head and thorax green or blue, elytra reddish brassy with green disc, often with humeral, marginal and apical dots. *scutellaris* Say. Surface green with same dots *rugifrons*, Dej.; black with same dots *modesta* Dej.; purple cupreous with such dots, sometimes confluent at margin *Lecontei* Hald.; unicolorous green or blue *unicolor* Dej.; black without dots *nigrior* Schaupp.

Thorax short, scarcely rugose with depressed hairs at the sides; elytra more elongate, dark blue with only a small apical lunule, labial palpi of the male pale at the base. *nigrocoerulea* Lec.

Thorax smooth; elytra brilliantly red cupreous with blue margin with a marginal and sometimes a humeral dot, front hairy..... *pulchra* Say.

Thorax slightly wrinkled at the sides; elytra with coarse but not densely placed punctures, which become rapidly finer towards the tip, where they are obsolete, black without markings, tip not serrulate; labrum one toothed, front bald..... *Hornii* Schaupp.

Thorax sparsely and slightly rugose; elytra bluish green, not deeply punctured, smooth towards base, with a humeral dot and a short, transverse marginal line, finely serrulate at tip, front hairy..... *pimeriana* Lec.

Normal markings,* the humeral ones often wanting or broken.

Front striate, glabrous, thorax finely rugose, strongly impressed; elytra strongly punctured, finely serrulate, green with marginal, antepical, apical and sometimes a discal dot, body beneath sparsely pilose..... *sexguttata* Fab. Blue or green immaculate *violacea* Fab.; green with humeral posthumeral, antepical and apical dots and a scarcely sinuate, somewhat abbreviated middle band *pabrüela* Dej.; black with same markings *consentanea* Dej.

Front striate, pilose with erect hairs, thorax short, somewhat flattened, granulate rugose, deeply impressed; elytra moderately punctured, less so near the margin, which is usually broad green shining, punctures elevated; slightly serrulate at tip; body beneath with long white hair, dense on the breast, sparser on the abdomen. Surface reddish cupreous, with an oblique scarcely sinuate band, not reaching the outer margin and an apical dot..... *purpurea* Oliv.

Black with the same markings *Audubonii* Lec.

Green with same markings *graminea* Schaupp. Green or blackish with a submarginal stripe dilated behind the humeri and before the apex and a middle band little curved or obtusely angulated *cimarrona* Lec.; green tinged with cupreous, humeral, posthumeral, antepical and apical dots with the middle band suddenly bent and more prolonged behind *decemnolata* Say; purple with same dots, and a sinuate middle band *limbalis* Lec.; black with same markings *spreti* Lec.; cupreous, the middle band less suddenly bent *amona* Lec.; head and thorax green or blue, elytra cupreous, with a very short middle band and an apical dot *splendida* Hentz.

GROUP 3.

Thorax convex, not margined, subquadrate; palpi of ♂ usually pale at base; elytra convex.

Normal markings complete, broad, connected by the white margin. Robust large species; labrum moderately large, three toothed, prominent in the middle.

Front, thorax and body very hairy.

Elytra red cupreous, brilliant, middle band obtusely bent..... *formosa* Say.

Metallic brown, same markings, middle band more deflexed *generosa* Dej.; red cupreous, more slender and convex, middle band more perpendicular *venusta* Lec.

*i. e. a humeral lunule, a middle band more or less bent and descending internally and an apical curved line usually bent inward at its anterior part.

Elytra black, less convex, more strongly punctured, labrum shorter; white margin very broad..... *latesignata* Lec.

A race has the markings narrower and the margin for a very little space disconnected before the apical lunule.

Front not hairy. Elytra dull bronzed brown, wings of ♀ slightly dilated in front of middle..... *Willistoni* Lec.

Markings broad not connected at margin.

Elytra red cupreous, brilliantly shining..... *fulgida* Say.

Elytra dull black..... *senilis* Horn.

Markings narrower, color usually brown bronze.

Humeral lunule long, prolonged obliquely (figs. 129, 130).

Middle fascia obtusely bent, extending at the margin nearly to the humeral and apical lunules, terminal part very long, nearly perpendicular..... *hyperborea* Lec.

A variety has the elytra white, with a green or blue sutural vitta narrowed behind, an oblique irregular line behind the middle and a small triangular dot before the middle, exterior and basal edge also green or blue, *limbata* Say.

This variety bears a very different aspect from the typical species *hyperborea*, but Dr. Leconte has in his cabinet intermediate forms between *limbata* and *hyperborea* (see fig. 129 a, b, c.)

Middle fascia rectangularly bent extending along the margin, terminal part short, oblique; apex of humeral lunule heavier (fig. 130)..... *ancocisconensis* Harr.

Humeral lunule much longer, obliquely prolonged, middle band but little extended along the margin (fig. 131)..... *vulgaris* Say.

Green variety with markings not reaching the margin *vibes* Horn. Variety with markings somewhat heavier (fig. 128) *obliquata* Kirby.

Humeral lunule C-shaped (fig. 132), thorax rugose and granulated, short; elytra punctured with elevated granules intermixed; serrate. Brown with complete markings, humeral lunule and middle band connected at margin (fig. 132)..... *repanda* Dej.

The humeral and apical lunule interrupted at the middle, middle band complete, but not extending along the margin, brown, (fig. 133); *oregona* Lec.; same, dark blue (fig. 134) *guttifera* Lec.; brown with all the markings broken (fig. 135) *guttata* Dej.

Humeral lunule as in *vulgaris*, but very faint, of the middle band hardly more than a triangular marginal spot visible; black opaque; elytra behind the humeri a little broader, sparsely punctured, tibiae pale at base (fig. 136).... *pusilla* Say.

Black with but a faint apical lunule *terricola* Say; green, more slender, with same faint markings as in *pusilla*, *cyanella* Lec.

GROUP 4.

Thorax convex, quadrate.

Humeral lunule perpendicularly inflexed and bent upwards at tip (fig. 137), thorax very hairy, that of the ♀ more flattened; brown or greenish.

hirticollis Say.

Humeral lunule as in *vulgaris*, markings usually connected by a white marginal band; which is, separated from the margin by narrow black stripe (fig. 138); green, brown, or black; thorax finely granulate. *cinctipennis* Lec. Without the white margin, middle band distant from the margin; black or brown, *imperfecta* Lec. (fig. 70).

With only five distinct round white spots, one humeral, two submarginal, one antepical and one discoidal on each elytron; the apical part entirely wanting; thorax alutaceous, not rugous or granulate. *rectilatera* Chaud.

GROUP 5.

Thorax subcylindrical, front bald.

Elytra punctured; with long slender markings, middle band slightly bent, oblique, connected with a marginal white line (fig. 140) *tenuisignata* Lec.

Elytra densely punctured with a row of unusual large green foveae near the suture, humeral lunule and middle band indicated by scattered punctures; apical lunule complete; black shining *punctulata* Oliv. Green variety with same markings *micans* Fab.

Elytra dispersedly deeply punctured, punctures often green, with narrow markings, middle band very tortuous, margin with a supplementary spot before the apical lunule; brown bronze or greenish. *tortuosa* Dej.

GROUP 6.

Thorax broadest behind; elytra broad, depressed, white, with exceptional green markings (fig. 91); elytra of ♀ angulated. *dorsalis* Say. Specimens without the markings (fig. 92). Smaller specimens, (fig. 93) *media* Lec.; still smaller (fig. 94) with markings somewhat heavier *Sauleyi* Querin.

THIRD DIVISION.

Humeral angles distinct, winged species. Underside unicolorous, but the hind trochanters rufous; shape of elytra in ♀ and ♂ usually different. Maritime, salt-marsh or fluviatile species. Eyes very large, prominent; legs very long.

GROUP I.

Cylindrical, moderately stout species, anus green.

Right mandible of ♂ toothed beneath, suture of ♂ retracted,

Mandibular tooth feeble; elytral apex of ♂ rounded; an emargination and spiniform prolongation of the inflexed portion of the retracted suture in the ♀ (pl. IV, a) *hamata* Brulle.

Mandibular tooth moderate; elytral apex with a slight sinuation near the suture, which is acutely but feebly prolonged in the ♂; the ♀ has the suture retracted with slight emargination and the inflexed portion squarely truncate (pl. IV, b) *marginata* Fab.

Right mandible of ♂ not toothed beneath; the elytra sinuate and those of the ♀ often with a tooth one fourth from the tip.

Elytra with basal white spot.

Sinuation of ♀ elytra distinct; elytral markings slender and not confused.

Middle band sinuous and long; markings very similar.

Cupreous; elytra coarsely and densely punctured, those of ♀ strongly sinuate near the tip; tooth acute and prominent, tip rounded; tip of ♂ obtuse (pl. IV, c) *cuprascens* Lec.

Bronzed; elytra more finely and less densely punctured, those of ♀ strongly sinuate, tooth rectangular, tip obtusely truncate; tip of ♂ subacute (pl. VI, d) *puritana* Horn.

Bronzed; elytra finely and sparsely punctured, those of the ♀ less sinuate, tooth rather obtuse, tip slightly prolonged, suture spinous; tip of ♂ slightly prolonged (pl. IV, d) *macra* Lec.

Middle band short, terminated by a short hook *Wapleri* Lec.

Sinuation of the ♀ elytra feeble, no tooth near tip. Elytral markings broad, confused, basal spot connected with humeral lunule *blanda* Dej.

Elytra without a basal spot; a strong sinuation with a moderate tooth in the ♀.

Markings not connected at margin, middle band with short, feebly sinuous longitudinal portion *nevadica* Lec.

Markings connected at margin, middle band with long, moderately sinuous longitudinal portion *sperata* Lec.

Markings very abnormal; humeral lunule obtusely bent and hooked, middle band curved towards the base and suddenly bent at an acute angle, and obliquely prolonged toward the suture and to near the apical lunule, which is greatly prolonged anteriorly *Gabbii* Horn,

GROUP 2.

Cylindrical, very slender species, anus green.

Elytra narrow, slender, with black suture, three times dilated, the whole under surface densely pubescent.

Labrum densely clothed with hairs, sutural dark space broad .. *hirtilabris* Lec.

Labrum glabrous, sutural dark space much narrower *graticosa* Querin.

GROUP 3.

Anus testaceous, hind trochanters sometimes purple instead of rufous.

Elytra flat and broad, with a few sinuous dark lines, legs, antennæ palpi and sutural margin pale *lepida* Dej.

Elytra brown bronzed with shallow green foveæ, middle band faint, narrow, broadest near margin, apical lunule complete *viridisticta* Chaud.

Elytra red cupreous with a white vitta far removed from the margin, slightly lobed internally, extending from the humerus to the tip where it bends around to the suture, legs rufous *lemniscata* Lec.

Elytra with broad white lobed margin, strongly punctured; densely pubescent beneath.

Front glabrous; elytra convex; green, brown or black.....*circumpicta* Laf.

Front densely pubescent; elytra more flat; brown.....*togata* Laf.

Elytra with broad white margin, the middle band hooked at tip and the anterior part of the apical lunule deeply cutting into the dark sutural space which is strongly punctured.....*pamphila* Chaud.

Elytra green or black with a marginal (sometimes also a posthumeral) dot and an entire apical lunule.

Elytral punctures stronger near the base, toward the apex obsolete; labrum three toothed; green or black.....*severa* Laf.

Elytral punctures deeper; the surface more polished; ♂ without, ♀ with one labral tooth; dark green.....*striga* Lec.

FOURTH DIVISION.

Underside partly rufous.

Normal markings, middle band usually in advance of its ordinary position, on the margin behind the middle band and on the disc just before the apical lunule are additional spots.

Thorax subquadrate, surface greenish black, with a humeral and posthumeral spot (rarely connected), middle band long, apical lunule..*haemorrhagica* Lec.

An immaculate variation, olivaceous green; *pacifica* Schaupp.

Thorax subcylindric, surface black, middle band short.

Humeral lunule entire, markings heavy.....*Hentzii* Dej.

Humeral lunule broken, markings slender.....*rufiventris* Dej.

Markings reduced to eight punctures on each elytron, 16 *punctata* Klug. Blue variety with scattered punctures *cumatilis* Lec.

Marginal white band.

Mentum with one tooth, thorax cylindrical, marginal band slightly bilobed. Opaque greenish or fuscous.....*marginipennis* Dej.

Mentum without tooth; thorax convex, subquadrate; marginal band lobed with a long straight oblique line for the middle band, the apical lunule is prolonged in front. Velvety black.....*Schauppia* Horn.

Apical lunule only and sometimes faint discal spots; black shining.

Elytra with a row of large punctures near the suture, thorax much longer than wide; middle band indicated by two faint white spots.....*abdominalis* Fab.

Variety with elytra scabrous and more deeply punctured *scabrosa* Schaupp.

Elytra finely and densely punctulate; thorax not longer than wide, terminal lunule represented by a narrow short line, which is sometimes obsolete. Head and thorax slightly bluish bronzed.....*politula* Lec.

Black with broad luteous markings; a humeral lunule, a straight middle band and a large round subapical spot.....*Sommeri* Mann.



John L. Lebona

OBITUARY.

John L. Le Conte, M. D.

Doctor Le Conte died on Thursday, Nov. 15th 1883, at 1 o'clock P.M., at his residence 1625 Spruce Street, Philadelphia, Pa.

John Lawrence Le Conte was the son of Major John Eatton Le Conte, U. S. A. and was born in New York, May 13th, 1825. He graduated from the College of Physicians and Surgeons in New York, 1846; and six years later he removed to Philadelphia.

During the late civil war he entered the army as surgeon of volunteers and was promoted to the rank of Lieutenant-Colonel and Medical Inspector U. S. A. For the last few years he was engaged in the U. S. Mint in Philadelphia as Assistant-Inspector.

Dr. Le Conte inherited the love for natural sciences from his father, who was also a distinguished naturalist. He wrote on different subjects and was well versed in Zoology and Mineralogy, but he made a special study of Entomology, notably of Coleoptera, describing about one half of the species known to inhabit the United States.

His first paper on Coleoptera appeared in 1844 and since that time he published over 150 papers, some of which are quite extensive and are standard works, as his Classification and his Rhynchophora. A list of his entomological writings is appended to this memoir.

As an Entomologist his fame is of world-wide recognition and he was no doubt the greatest on this continent; his name can never die.

He made quite extensive travels in this country for scientific investigation, was several times in Europe where he studied the typical collections of North American Coleoptera in London and Paris, and he was also acquainted with all the leading Entomologists of the world; and what we have to appreciate most, he was an excellent teacher and a fast friend to our Dr. Horn, with whom he worked in harmony all the time, and with whom he edited his Classification of the Coleoptera and the Rhynchophora.

There was never the slightest jealousy between these two friends and naturalists, a very refreshing example indeed compared with the enmity and personal attacks indulged in by other persons engaged in similar pursuits.

Unfortunately Dr. Le Conte's Writings are scattered among so many periodicals in this country and abroad that it is simply impossible to obtain a full set of them, as many, especially the earlier publications, have been a long time out of print. Would it not now be well, to have all his writings republished in the same way as Dr. Le Conte himself republished Says' Entomological Writings? And where can a man be found who is better qualified to supervise the edition than Dr. Horn? Would not that be a monument set in memory of the deceased, more durable than bronze (*ære perennius*)?

Practising as a physician he found time besides the immense work done in his writings to fill positions as President, Secretary, Member of Committees in different scientific Societies, such as the Academy of Natural Sciences, American Philosophical and American Entomological Societies, and American Association for the Advancement of Science. He found even the time to help along book-less beginners by naming their *Harpali pennsylvanici*, *Pterostichi lucublandi*, and other equally rare species.

I shall ever remember his kind receptions when I visited him during the Christmas weeks of latter years. After his colored porter had opened the door for me and had taken him my card, the Doctor shouted from the top of the stairs: "Welcome! Very glad to see you! Please, come up stairs!" He talked with me for hours, and gave me all the information I desired, and then left me alone with his collection. He presented me many good typical specimens and I shall never forget his kindness.

He had been a few times during the past two years very ill and although we were fearing for the worst, we still were shocked on receiving Dr. Horn's laconic message:

"Dr. Le Conte died to day at 1 P.M."

At a special meeting convoked for Saturday Nov. 17th, the Brooklyn Entomological Society resolved to send a Committee of three of its Members to Philadelphia, to place a laurel-wreath on our deceased Master's, Member's, Co-worker's, and Friend's sarcophagus; the laurel he had so very well deserved. This resolution was duly carried out.

F. G. SCHAUPP.

Annals of the Lyceum of Natural History of New York.

1. Monograph of the species of *Pasimachus* inhabiting the U. S. with descriptions of two new genera belonging to the family *Carabidina*. 1848, vol. IV, pp. 141—154, with 2 plates.
 2. On certain *Coleoptera*, indigenous to the Eastern and Western Continents. 1848, vol. IV, pp. 159—63.
 3. A descriptive Catalogue of the *Geodephagous Coleoptera* inhabiting the U. S. east of the Rocky Mountains. 1848, v. IV, pp. 172—233 and 334—474, with two plates.
 4. Synopsis of the Coleopterous Insects of the Group *Cleridae* which inhabit the United States. 1849, vol. V, pp. 9—36.
 5. Descriptions of New Species of *Coleoptera*, from California. 1851—52, vol. V, pp. 125—216.
-

Proceedings of the Boston Society of Natural History.

1. Descriptions of some new species of Coleopterous insects inhabiting the U. S. 1844, vol. I, p. 201.
 2. Descriptions of new species (to the Catalogue of the *Coleoptera* of Mt. Washington. N. H. by E. P. Austin). 1874, vol. XVI, pp. 265—76.
-

Journal of the Boston Society of Natural History.

1. Description of some new and interesting insects, inhabiting the U. S. [The same species desc. as in No. 1. Boston Proc.] 1845, vol. V, pp. 203—9 with one plate.
 2. On the *Pselaphidae* of the U. S.; 1850, vol. VI, pp. 64—110.
-

Transactions of the American Philosophical Society of Philadelphia.

1. Notes on the Classification of the *Carabidae* of the U. S. 1853, vol. X, pp. 363 to 403.
 2. Revision of the *Elatерidae* of the U. S. 1853, vol. X, pp. 405—508.
 3. Revision of the *Cicindelidae* of the U. S. 1857, vol. XI, p. 27—63 with one plate.
 4. Revision of the *Buprestidae* of the U. S. 1859, vol. XI, pp. 187—258 with one pl.
-

Proceedings of the American Philosophical Society of Philadelphia.

1. The *Rhynchophora* of America, North of Mexico. 1876, vol. XV, pp. III—XVI and 1—455, (together with Dr. Horn).
2. Tabular Synopsis of the *Rhynchophora* of America. 1877, vol. XVI, pp. 1—8.
3. Additional description of new species [to the *Coleoptera* of Florida by E. A. Schwarz.] 1878, vol. XVII, pp. 373—434.
4. Descriptions of new species (to H. G. Hubbard's and E. A. Schwarz' *Coleoptera* of Michigan). 1878, vol. XVII, pp. 593—623.

Journal of the Academy of Natural Sciences of Philadelphia.

1. Fragmenta Entomologica. 1847. (New series) vol. I, pp. 71—93.
2. An attempt to classify the longicorn Coleoptera of the part of America, North of Mexico. 1850, v. I, pp. 311—340; 1850, vol. II, pp. 5—38; 1852, vol. II, pp. 99—112; pp. 139—178.
3. Synopsis of the Species of *Pterostichus* Bon. and allied genera inhabiting temperate North America. 1852, vol. II, pp. 225—56.
4. Synopsis of the *Melolonthidae* of the U. S. 1856, vol. III, pp. 225—88.
5. Catalogue of the Coleoptera of the regions adjacent to the boundary line between the United States and Mexico. 1858, vol. IV, pp. 9—42, with one plate.

Proceedings of the Academy of Natural Sciences of Philadelphia.

1. Description of new species of N. A. Coleoptera. 1844, vol. II, pp. 48—53.

Vol. V. (1851.)

2. Synopsis of the species of *Donacia*, Fab. inhabiting the U. S. pp. 310—316.
3. Zoological Notes (about fauna of Panama) pp. 316—320.
4. Synopsis of the *Lampyrides* of temperate North America. pp. 331—347.

Vol. VI. (1852—1853.)

5. Hints towards a natural classification of the family *Histrini* of Coleopterous Insects. pp. 36—41.
6. Synopsis of the *Parnidae* of U. S. pp. 41—45.
7. Synopsis of the *Eucnemides* of temperate N. A. pp. 45—49.
8. Remarks on some Coleopt. Insects collected by S. W. Woodhouse. M. D., in Missouri Territory and N. Mexico. pp. 65—68.
9. Synopsis of the *Anthicites* of the U. S. pp. 91—104.
10. Remarks upon the *Coccinellidae* of the U. S. pp. 129—145.
11. Synopsis of the *Scydmaenidae* of the U. S. pp. 149—157.
12. Catalogue of the *Melyrides* of the U. S. with description of new species. pp. 163 to 171.
13. Description of 20 new species of Coleoptera inhabiting the U. S. 1853, vol. VI, pp. 226—235.
14. Synopsis of the *Silphales* of America, North of Mexico. pp. 274—87.
15. Synopsis of the species of the Histeroid genus *Abraeus*, Leach, inhabiting the U. S. with description of two nearly allied genera, pp. 287—92.
16. Synopsis of the *Meloides* of the U. S. pp. 328—50.
17. Synopsis of the *Atopidae*, *Rhipiceridae*, and *Cyphonidae* of U. S. pp. 350—57.
18. Synopsis of the *Endomychidae* of the U. S. pp. 357—60.
19. Description of some new Coleoptera from Texas, chiefly collected by the Mex. Boundary Commission. pp. 439—48.

Vol. VII. (1854—55.)

20. Description of some new Coleoptera from Oregon, collected by D. J. G. Cooper of the North Pacific R. R. Expedition etc. pp. 16—20.
21. Synopsis of the *Oedemeridae* of the U. S. pp. 20—22.

22. Notes on the genus *Amblychila*, Say. pp. 32—34.
23. Synopsis of the species of *Platynus* and allied genera inhabiting the U. S. pp. 35—59.
24. Synopsis of the *Cucuiides* of the U. S. pp. 73—79.
25. Notice of some Coleopterous Insects from the collection of the Mexican Boundary Commission. pp. 79—85.
26. Synopsis of the *Dermestidæ* of the U. S. pp. 106—13.
27. Synopsis of the *Byrrhidæ* of the U. S. pp. 113—17.
28. Synopsis of the *Erotylidæ* of the U. S. pp. 158—63.
29. Description of the spec. of *Trox* and *Omorgus* inhabiting the U. S. pp. 211—16.
30. Some corrections in the nomenclature of Coleoptera found in the U. S. pp. 216—20.
31. Descriptions of new Coleoptera collected by Thos. H. Webb. M.D., pp. 220—25.
32. Synopsis of the *Pyrochroides* of the U. S. 1855, vol. VII, pp. 270—77.
33. Remarks on some misrepresentations contained in the "Catalogue des larves des Coleopteres" by M. M. Chapuis and Candeze. pp. 288—89.
34. Analytical table of the species of *Hydroporus* found in the U. S. pp. 290—99.
35. Synopsis of the *Lathridiides* of the U. S. and Northern contiguous Territories. pp. 299—305.
36. Notes on the *Amaræ* of the U. S. pp. 346—56.
37. Synopsis of the *Hydrophilidæ* of the U. S. pp. 356—75.

Vol. VIII. (1856).

38. Synopsis of the *Mycetophagidæ* of the U. S. pp. 12—15.
39. Synopsis of the *Phalacridæ* of the U. S. pp. 15—17.
40. Notes on the genus *Lithodus* Schoenh. pp. 18—19.
41. Notice of three genera of *Scarabæidæ* found in the U. S. pp. 19—25.
42. Analytical table of the species of *Chlaenius* found in the U. S. pp. 25—29.

1857. (Vol. IX.)

43. Catalogue of the species of *Bembidium* found in the U. S. and contiguous Northern Regions. pp. 2—6.
44. Index to the *Buprestidæ* of the U. S. described in the works of Laporte and Gory with notes. pp. 6—11.
45. Synopsis of the spec. of *Olivina* and allied genera inhabiting U. S. pp. 75—83.

1858. (Vol. X.)

46. Descriptions of new species of Coleoptera chiefly collected by the U. S. and Mexican Boundary Commission, under Maj. W. H. Emory, U. S. A. pp. 59—89.
47. Note on the species of *Eleodes* found within the U. S. pp. 180—88.

1859. (Vol. XI.)

48. Catalogue of the Coleoptera of Fort Tejon. Cal. pp. 69—90.
49. Addition to the Coleopterous Fauna of Northern California and Oregon. pp. 281 to 292.
50. Descriptions of new species of the Coleopterous family Histeridæ. pp. 310—315.

1860. (VOL. XII.)

51. Notes on Coleoptera found at Fort Simpson, Mackenzie River, with remarks on Northern Species. pp. 315—21.
52. Synopsis of the *Scaphidiidae* of the U. S. pp. 321—24.

1861. (Vol. XIII.)

53. Notes on the Coleopterous Fauna of Lower Cal. pp. 335—38.
54. New species of Coleoptera inhabiting the Pacific district of U. S. pp. 338—59.

1862. (Vol. XIV.)

55. Notes on the Classification of *Cerambycidae* with description of new spec. p. 38—43.
56. Synopsis of the *Mordellidae* of the U. S. pp. 43—51.
57. Notes on the species of *Calosoma* inhabiting the U. S. pp. 52—53.
58. Synopsis of the species of *Colymbetes* inhabiting America, north of Mexico. pp. 521—23.
59. Notes on the species of *Brachinus* inhabiting the U. S. pp. 523—25.
(Note on *Strepsiptera*) 1864. pp. 49—50.

1865. (Vol. XVII.)

60. Note on the species of *Myodites* Latr. inhabiting the U. S. pp. 96—98.
61. Note on species of *Harpalus* inhabiting America north of Mexico. pp. 98—104.
62. On the species of *Galeruca* and allied genera inhabiting N. A. pp. 204—22.
63. Prodomus of a Monograph of the species of the Tribe *Anobiini* of the Family *Ptinidae* inhabiting North America. pp. 222—44.

1866. (Vol. XVIII.)

64. Remarks on the sub-family *Clavigeridae*. pp. 108—109.
65. List of the Coleoptera collected in the mountains of Lycoming County, Pa. pp. 346—48.
66. List of Coleoptera collected near Fort Whipple, Arizona, by Dr. Elliott Coues, U. S. A. in 1864—65. pp. 348—349.
67. Revision of the *Dasytini* of the U. S. pp. 349—61.
68. Additions to the Coleopterous Fauna of the U. S. No. 1. pp. 361—394.

1868. (Vol. XX.)

69. Analytical table of the species of *Baridius* inhabiting the U. S. pp. 361—65.
70. The *Gyrinidae* of America, north of Mexico. pp. 365—73.
71. Notes on the species of *Ajonoderus*, *Bradycellus* and *Stenolophus*, inhabiting America north of Mexico. pp. 373—82.

1873. (Vol. XXV.)

72. (Remarks upon the the death of) F. E. Melsheimer, pp. 257—58.
73. The *Pterostichi* of the U. S. pp. 302—20.
74. Synonymical Remarks upon N. A. Coleoptera, pp. 321—36

1876. (Vol. XXVIII.)

75. Destructive Coleoptera. p. 195.
76. Report on Insects introduced by means of the Inter. Exhibition. pp. 267—71.
77. On Rocky Mountain Locusts. 1877. pp. 129—31.

Transactions of the American Entomological Society of Philadelphia.

1. New Coleoptera collected on the Survey for the Extension of the Union Pacific Railway, E.D. from Kansas to Fort Craig, New Mex. 1868. Vol. II. pp. 49-59.
2. Coleoptera of the U. S. Coast Survey Expedition to Alaska under charge of Mr. George Davidson. 1868, Vol II, pp. 59-64.
3. Notes and an Appendix. (To C. Zimmermann's Synopsis of the *Scolytidae* of America, North of Mexico.) 1868, Vol. II, pp. 141-78.
4. Synonymical notes on Coleoptera of the U. S., with descriptions of new species, from the MSS. of the late Dr. C. Zimmermann. 1869, Vol. II. pp. 243-59.
5. Description of New Coleoptera, chiefly from the Pacific Slope of North America. 1874 Vol.V. pp. 43-72.
6. Note on the Genus *Pleocomia* Lec. pp. 81-84.
7. On the *Cupesidae* of North America. pp. 87-88.
8. Notes on the *Cicindelidae* of the U. S. 1875. Vol. V. pp. 157-62.
9. On the *Rhyssodidae* of the U. S. pp. 162-68.
10. Description of New Coleoptera of the U. S. with notes on geographical distribution. pp. 169-76.
11. On the Affinities of *Hypocephalus*; 1876, Vol. V. pp. 209-18.
12. On certain genera of *Staphylinidae*, *Oxytelini*, *Piestidae* and *Micropeplidae*, as represented in the fauna of the U. S. 1877, vol. VI, pp. 213-52.
13. Short Studies of N. A. Coleoptera. 1880, vol. VIII, pp. 163-218.
14. Synopsis of the *Lampyridae* of the U. S. 1881. vol. IX. pp. 15-72.

Smithsonian Miscellaneous Collections.

1. Catalogue of the described Coleoptera of the U. S. By Fred. E. Melsheimer. Revised by S. S. Haldeman and J. L. Leconte. 1853, pp. 16-174.
2. Instructions for collecting Coleoptera. (Annual Report of the Board of Regents.) 1859, pp. 160-64.
3. The Coleoptera of Kansas and Eastern New Mexico. (Contributions to knowledge.) 1859. vol. XI, pp. 1-58, two plates, one map.
4. Classification of the Coleoptera of North America, Part. I, (Miscellaneous Collections) 1862, vol. III, pp. 1-286.
5. List of the Coleoptera of North America, Part 1. (Misc. coll.) 1867, v. VI, p. 1-78.
6. New species of North American Coleoptera. Part I, (Misc. coll.) 1867, vol. VI, pp. 1-177.
7. New species of the North American Coleoptera, Part 2, (Misc. coll.) 1874, vol. XI. pp. 169-240.
8. Classification of the Coleoptera of North America. Part 2. (Misc. coll.) 1873, vol. XI, pp. 279-348.
9. Classification of the Coleoptera of North America. [Prepared in company with Dr. Horn.] (Misc. coll.) 1883. pp. I-XXXVIII. and 1-567.

U. S. Government's Publications.

1. Report upon the insects collected on the Survey. (*Reports on Explorations and Surveys etc. from the Mississippi River to the Pacific Ocean. Washington*) 1860, vol. XII. Part 3. pp. 1—72. With 2 plates.
2. Report upon new species of Coleoptera collected by the Expeditions for Geographical Surveys etc. (*Annual Report of the Chief of Engineers to the Secretary of War for 1876. Washington*) 1876, Part 3, pp. 516—20.
3. The Coleoptera of the Alpine Regions of the Rocky Mountains. (*Bull. Geol. and Geogr. Survey. Washington*) 1878, vol. IV, No. 2, pp. 447—80.
4. The Coleoptera of the Alpine Rocky Mountains Regions. Part 2. (*Bull. Geol. and Geogr. Survey. Washington*) 1879, vol. V, No. 3, pp. 499—520.

American Naturalist.

1. Salt-water insects. 1868. vol. II. pp. 329—30.
2. Monograph of the *Trichopterygidae*. (Request for subsc. to Rev. A. Matthews') 1869, vol. III. pp. 213—14.
3. On the preservation of Entomological Cabinets. 1869. vol. III, pp. 307—9.
4. Hints for the promotion of economy Entomology in the U. S. 1873. vol. VII, pp. 710—22.
5. The Classification of the *Rhynchophorous* Coleoptera. 1874. vol. VIII, pp. 385—96 and 452—70.
6. An additional character for the definition of *Rhynchophorous* Coleoptera. 1875, vol. IX, pp. 112—13.
7. Address of the retiring president of the Am. Assoc. for the adv. of Science. 1875. vol. IX, pp. 481—98.

Proceedings of the Am. Association for the Advancement of Science.

1. On some curious habits of a species of *Asilus*. 1850. vol. II, p. 195.
2. On the geographical distributions of animals in California. 1852. vol. VI, pp. 248—54.
3. An instance of replacement of injurious insects by human agency. 1875. vol. XXIII, p. 44.

Canadian Entomologist.

1. On some changes in the nomenclature of N. A. coleoptera, which have been recently proposed. 1874. vol. VI. pp. 186—96.
2. On Entomological Nomenclature. 1874, vol. VI, pp. 201.—6. and 223—26.
3. Methods of subduing insects injurious to agriculture. 1875, vol. VII, pp. 167—72.
4. (Address as President of the Entom. Club of the Am. Assoc. Adv. Science.) 1876. vol. VIII, pp. 176—78.

Buffalo Society of Natural Science.

1. Notes on the species of *Pasimachus*. 1874. vol. I, pp. 266—73.
2. New Coleoptera. 1881. vol. IV, pp. 27—28, with one plate.

Bulletin of the Brooklyn Entomological Society.

1. An excellent trap for small *Silphidae* etc. 1878, vol. I. p. 11.
2. (Collecting at Capron Springs W. Va.) 1878. vol. I, p. 39.
3. Description of a new species of *Calosoma*. 1878. vol. I, p. 61.
4. Synoptic table of the species of *Calosoma*. 1878. vol. I, pp. 64—66.
5. Synopsis of the N. A. species of *Platynus* with description of new species. 1879, vol. II, pp. 43—58.
6. Synoptic tables [of *Panagaeus*, *Heliumorpha*, *Galerita*, *Zuphium* (with desc. of a new spec.), *Diaphorus*.] 1879. vol. II. pp. 59—62. [*Casnonia*, *Ega*, *Lachnophorus*, *Plochionus*.] 1880. vol. II. pp. 85—86. [*Myas*] 1882. v. V, p. 63.

North American Naturalist.

New Coleoptera. 1879, vol. I, pp. 1—5 with one plate.

Psyche.

Stridulation of Coleoptera. 1878. vol. II. p. 126.

Journal of Science and Art.

On the systematic value of *Rhynchophorous* Coleoptera etc. 1867, s. 2, vol. XLIV, pp. 41—43, with cuts.

Annals and Magazin of Natural History. London.

1. List of Coleoptera collected in Vancouver's Island by Henry and Joseph Matthews with description of some new species. 1869, s. 4, vol. IV, pp. 369—85.
2. Synonymical notes on N. A. Coleoptera. 1870, s. 4, vol. IV, pp. 394—404.

Harold's Coleopterologische Hefte. Munchen.

Description of a new species of *Aphodius*. 1872. vol. X, p. 193.

Arcanae Naturae. Paris.

Description of some genera and species of Coleoptera from the vicinity of the southern boundary of the U. S. 1859, vol. III, pp. 121—28, with 2 plates.

Proceedings of the Zoological Society of London.

On *Platysyllidae*, a new family of Coleoptera. 1872. pp. 799—804, with one plate.

Nature.

Parasite of the beaver. 1872. vol. VI. p. 162.

(General remarks upon the Coleoptera of Lake Superior. (*Lake Superior*, Agassiz and Cabot. Boston) 1850, pp. 201—42, with one plate.

American Entomology. (*The complete writings of Thomas Say, edited and with notes on Coleoptera by Leronte*. New York) 1869. Two volumes with 54 plates.

Besides these papers there are many more smaller articles in Berliner Entomologische Zeitschrift, in Packard's Record of Am. Entomology, in the Proceedings of the Transactions of Am. Entom. Society etc. etc.

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BIBLIOGRAPHY.

Pilatei Guerin (*Dromochorus*). Blackish-gray above, shining black beneath. Head large, smooth; labrum advanced, in the middle three toothed; thorax cylindric, longer than broad, with faint impressions; elytra twice longer than broad, oval, with green punctures on the disc, in a row near the suture and dispersed in its neighborhood.

The var. **Belfragei** Salle, is more black, elytra smooth or punctured, but no green punctures. This variety has been for many years in every collection as *Pilatei* Guerin. I received in 1874 from Mr. Emil Schorbach in New Orleans a few specimens, being gray and having the green punctures, which Dr. Leconte described as *maga*. M. A. Salle from Paris saw them in Leconte's Collection and to show the wanderings of a type I quote Mr. Salle's words: "I know that the type of '*Dromochorus* [*Pilatei*]' had passed from the collection Pilate to that of Mr. J. Thomson and that Mr. Janson had bought the latter and sold half of it to Mr. Edwin Brown. In the collection of Thompson there were two specimens of this insect, Pilate's type (coming from 'Velasco, Tex.),' and a specimen he had bought in 1861 from Mr. H. Deyrolle, who had received it from Mr. Perroud, who had received it 'from Dallas, Tex.'—That is what I call the pedigree of an Insect! All my specimens of *Pilatei* are from the North shore of Lake Pontchartrain, La.; those of *Belfragei* are found in Tex. and Kans. in July and Aug. Length 12—15 mm.

Guerin Ann. Fr. 1845. Bull. p. 96. Mag. Zool. 4845, pl. 162, *maga* Lec. Trans. Am. Ent. Soc. 1875, V, 161. var. *Belfragei* Salle, Ann. Fr. 1877. Bull. p. 6.

Celeripes Lec. Brown bronze, head granulate-rugose, eyes very large, labrum with one tooth; thorax long, cylindrical, impressions faint; elytra coarsely punctured, sparsely clothed with short hair; there is much variation in the white markings, which are usually a discoidal dot representing the tip of humeral lunule, a marginal line near the middle and faint apical lunule; the variety *cursitans* Lec. has the elytra less deeply punctured. Some specimens have only the apical lunule. Occurs in Ills., Nebr., Kans., Dac. Length 7.5—8.5 mm.

Lec. Ann. Lyc. 1848, IV, 183; pl. 14. f. 14. var. *cursitans* Lec. Trans. Am. Philos. Soc. 1856, XI, 60.

Obsoleta Say. Black, sericeous, black beneath; head glabrous, labrum not advanced in middle, five-toothed, the outer teeth often indistinct; thorax trapezoidal, rather flat, almost margined; with a few hairs at the sides, elytra indistinctly punctured except towards the base, where the punctures are large and scattered. Markings a transverse white abbreviated submarginal line near the middle and an obsolete apical dusky dot; or black immaculate.

Var. *vulturina* Lec. Black above, green beneath; elytra with a humeral dot, an obtusely angulated middle band and an apical lunule, more or less obsolete; labrum three-toothed, sometimes five-toothed; Dr. Horn mentions green specimens from Arizona.

Var. *prasina*. Olivaceous green above, metallic green beneath, elytra immaculate, labrum three-toothed.

Leconte mentions a specimen of dark blue color, beneath blue, legs blue, elytra with humeral, and posthumeral dot, middle band not attaining the margin and an apical lunule, from Arizona, and I have myself a specimen with coppery surface, beneath blue, and legs green, from New Mexico. Occurs in Tex., Ark., New Mex., and Arizona. Length 16—20 mm.

Say, Journ. Ac. Philad. 1823, III, 143; Lec. Ann. Lyc IV, 178, pl. 13, f. 4. *vulturina* Lec. Proc. Ac. Philad. VI, 439. *prasina* Lec. (obsoleta † var.) Lec. Ann. Lyc. IV, 178.

Unipunctata Fab. Brown, opaque, sericeous, beneath dark blue; head granulate, bald; labrum three-toothed; thorax flat, granulate, trapezoidal, as long as broad, scarcely hairy at the sides; elytra flattened, with dispersed green foveae and irregular green punctures, marginal triangular white dot. Occurs in N. Y., Pa., Ga., Mo. Length 16—18 mm.

Fab. Syst. Ent. p. 225: Oliv. Ent. II, 33, p. 23. pl. 4, f. 27. Say, Trans. Am. Philos. Soc. I, new ser. t. 13. Say (Lec. Ed.) II, 425 and 522.

Longilabris Say. Blackish or dark brown, beneath purple black or dark green. Head bald in front broadly excavated. The labrum white, nearly as long as broad, rounded in front and obsoletely three-toothed and a little dilated at base; thorax trapezoidal, short almost margined, rugose, deeply impressed; elytra densely punctured, near the suture a row of faint large foveæ; the markings are variable, usually a humeral spot, another before the middle on the margin, a reclivate nearly transverse band on the middle and a spot at the posterior curve of the elytra, being the anterior part of the apical lunule; the termi-

nal part is always wanting. Occurs in Hud. Bay T., Can., Yukon, Wisc., Nov. Sc., Col., Nebr., Newfoundland.

Say, Long's 2d Exp. pp. 268—69. Lec. Ed. I, 176. *albilabris*, Kirby Fn. bor. Am. IV, 12, pl. 1.

Var. *perviridis* Schaupp Green opaque, beneath brilliant green, identical with *longilabris* except that the humeral lunule is entire and the elytra are less deeply punctured and the foveæ less distinct. Occurs in Cal., Oregon, Utah and Newfdld.

Var. *montana* Lec. Black, more shining, elytra also less deeply punctured with only a transverse sinuate, obtusely reflexed white middle band, often wanting; labrum of the ♀ black. Occurs in Utah, Nebr. Montana.

Lec. Proc. Ac. Phila. 1861, p. 338.

Var. *Laurentii* Schaupp. Dark brown, slightly bronzed, beneath blue-green; the humeral lunule entire, connected with the middle band by a narrow submarginal white line, and the apical lunule entire and dilated anteriorly into a large spot. Occurs in Col.

Lec. Proc. Ac. Phila., 1866, p. 362.

Scutellaris Say. Head and thorax green or blue, elytra reddish brassy, in the middle of the base green. Head hairy, scarcely rugose, labrum three-toothed; thorax convex, densely and finely rugose, hairy; elytra obtusely punctured with obsolete foveæ near the suture with marginal dot and an apical lunule, often wanting; outer side of middle tibiæ densely pubescent. Occurs in Kans., Ark., Col., Nebr. on sand-hills in June. Length 12 mm.

Var. *rugifrons* Dej. Green. Elytra with posthumeral dot, triangular dot at middle, and apical lunule, sometimes wanting. Occurs in N. Y., Rhode Isl., Md. Length 11—12 mm.

Var. *modesta* Dej. Black with same markings. N. Y., N. J., Penns. Length 12 mm.

Var. *Lecontei* Dej. Brown; humeral lunule sometimes entire, sometimes connected with the humeral and apical lunules. Ills. Ia. Length 12 mm.

Var. *unicolor* Dej. Green or blue without markings. Tex., Ga., Fla. 12 mm.

Var. *nigrior* Schaupp. Black without markings. Ga. Length 12 mm.

Say, Journ. Ac. Phila. 1823, III, 140; Lec. Ann. Lyc. IV, 176, pl. 13, f. 2; *rugifrons* Dej. Spec. 1825, I, 51; *denticulata* Hentz, Trans. Am. Philos. Soc. III, 254; pl. 2, f. 1; *modesta* Dej. Spec. I, 52; *obscura* Say, Trans. Am. Philos. Soc. I, 418; *unicolor* Dej. Spec. I, 52; V, 210, Chevr. Col. Mex. II. fasc. 8, nr. 177.

Pulchra Say. Red cupreous, highly polished, with blue or green margins, beneath blue; head hairy, labrum short, wide, slightly three-toothed; thorax rugose; elytra polished, punctured only near base, with a transverse white abbreviated line on the middle and sometimes a round humeral dot. Occurs in Col. and Kans. Length 19 mm.

Say, Journ. Ac. Phila. 1823, III, 142; Lec. Ed. II, 91; Dej. Spec. II, 421; Lec. Ann. Lyc. IV, 175.

Hornii Schaupp. Black shining glabrous above and beneath. Head bald; labrum short with an acute tooth at middle; thorax slightly wrinkled at the sides; elytra coarsely but not densely punctured near the base, the punctures becoming rapidly finer towards the smooth tip, no markings at all. Only one pair in Dr. Horn's collection from New Mexico. Length 14 mm.

Anthracina || Horn. Trans. Am. Ent. Soc. 1880, VIII, 139.

Nigrocoerulea Lec. Dark blue, sericeous shining, head glabrous, finely rugose; labrum three-toothed; thorax hardly rugose, hairy at the sides; elytra obsoletely punctured, near the suture a row of foveæ; a faint apical lunule. Resembles *punctulata*, var. *micans* but is stouter. Occurs in Ariz., New Mex. and Col. Length 13.5—14 mm.

Lec. Ann. Lyc. IV, 181, pl. 14, f. 9.

Pimeriana Lec. Elytra blue, head and thorax green, beneath blue; head hairy, finely and sparsely rugose; labrum obsoletely three-toothed; thorax finely rugose; elytra with shallow punctures, which are nearly obliterated near the tip, with a humeral dot and a short transverse marginal line. (In the synoptic table, page 30, line 8, there is a clerical error, read instead of—smooth towards base—smooth towards the apex.) Occurs in Mex. and New Mexico. Length 12 mm.

Proc. Ac. Phila. 1866, p. 363, *viatica* Lec. Trans. Am. Philos. Soc. 1856, vol. XI, 62.

Sexguttata Fab. Green above and beneath, head bald, rugose behind; labrum strongly three-toothed; thorax slightly rugose; elytra strongly punctured with a marginal, anteapical, apical and sometimes a discal dot. Occurs in New York, N. J., Pa., Md., Ga., Iowa, Tex. &c. Length 10—14 mm. It lives in shady roads or clear woods, hides often under stones and loose bark.

Some specimens have traces of very faint lines, between the marginal and discal dots, nearly uniting them and thus forming a middle band.

Var. *violacea* Fab. Blue or green immaculate. Occurs in Kansas.

Var. *patruela* Dej. Green, more opaque, beneath green shining; elytra with a humeral, posthumeral, anteapical and apical dot and a middle band, consisting of a large lateral triangular spot connected with a small discoidal one, by a slightly oblique narrow line. Occurs in Wisc., Pa., Md., in shady paths on hills. Length 13—14.5 mm.

Var. *consentanea* Dej. Black above and beneath with the same markings as in *patruela*. Occurs in Pa., Nebr.

Fab. Syst. Ent. p. 226. Say, Trans. Am. Philos. Soc., new ser. 1818, I, 414, pl. 13, f. 4. Dej. Spec. I, 53. Lec. Ann. Lyc. IV, 176. *violacea* Fab. Syst. El. I. 232. *patruela* Dej, Spec. I. 62. Lec. Ann. Lyc. IV, 178. *consentanea*, Dej. Spec. I, 63.

Purpurea Oliv. Our most variable species in coloring and markings.

Reddish cupreous, margin green brilliant, beneath bluish green; head hairy, rugose; thorax granulate, rugose, short; elytra moderately punctured, punctures elevated, suture and exterior sub-margin green, the markings consist of an oblique scarcely sinuate middle band, not extending to the margin and an apical dot. In pastures on grassy roads, early in spring. Occurs in N. Y., Nebr., Kans., Mont., and Wisc. Length 14—16 mm.

Var. *Audubonii* Lec. Black with dark blue margin, beneath dark blue; elytra with the same markings as *purpurea*. Occurs in Kans. in spring on the open clayey bottoms of ravines and hollows near the chalk washes; not usually intermingled with the next variety (Williston Kans. Tr. Acad. Sc. VI, 32.) Length 14—15 mm.

Var. *graminea* Schaupp. Green with cupreous tinge on the thorax and the margin of the elytra, and the same markings as the above. Occurs Kans., Cal.

Var. *cimarrona* Lec. Black or green, opaque, beneath dark green shining; head rugose, hairy; labrum three-toothed; thorax densely rugose at both sides, transverse impressions deep; elytra twice broader than the thorax, granulate punctate, a submarginal stripe dilated behind the humeri and before the apex, a middle band oblique sometimes slightly curved or obtusely angulated. In some specimens the marginal stripe is interrupted before and behind the middle band, some specimens have also on the thorax a cupreous tinge. Occurs in Col. and New Mex. Length 14—15 mm.

Var. *decem-notata* Say. Green above tinged with cupreous, beneath bluish-green; head rugose, hairy; labrum three-toothed; thorax rugose, impressions deep; elytra dull green margined with bright green or blue, four white dots, humeral, posthumeral, anteapical and apical and a suddenly bent middle band not dilated at tip. In some specimens the apical and anteapical spot are connected by a slender white line, so that the apical lunule is complete. In Leconte's collection is a specimen without the humeral and posthumeral dots, from Cal., and another from Nebraska with the spots reduced in size and the middle band represented only by its outer part which is perpendicular to the side margin of the elytra. Occurs in Col., Cal., Nebr., and Mont. Length 13—14 mm.

Var. *limbalis* Lec. Purple or cupreous, beneath blue; marginal spots often wanting. Occurs in New York. Length 14 mm.

Var. *limbalis* Klug. Cupreous, margins and beneath brilliantly green; humeral lunule, middle band and apical lunule complete. Occurs in New York, Ohio, Ky., Kans., Col. Length 13—14.5 mm.

Var. *spretta* Lec. Black with markings complete. Occurs in Maine. Length 13 mm.

Var. *amaena*. Cupreous, margin and beneath green; the four marginal dots somewhat smaller, the middle band rises perpendicularly and is less bent than in *limbalis*. Occurs in Northern Missouri. Length 13—14 mm.

Var. *splendida* Hentz. Head and thorax green or blue, elytra cupreous with a short middle band and an apical dot, beneath and margin green. There is also a great variation in the markings; some specimens from Texas have no markings at all, some have only an apical dot, some only a fine spot at the middle of the margin and some have the four marginal dots and the middle band. Occurs in N. Y., Tex., Nebr., Kans. N.C. Length 14—15 mm.

Oliv. Ent. II, 33, p. 14, pl. 3, f. 34; Say, Trans. Am. Philos. Soc. new series, I, 419. Lec. Ann. Lyc. IV, 176. *marginalis* Fab. Syst. El. I, 240. Herbst. Kaefer, X, 175, pl. 171, f. 10. Dej. Spec. I, 55; V, 210. *Audubonii* Lec. Bost. Journal, V, 207, pl. 18, fig. 7. *graminea* Schaupp, see page 80; *cimarrona* Lec. Trans. Am. Ent. Soc. II, 49. *decem-notata* Say, Journ. Ac. Phila. I, 19. Am. Ent. (Lec. Ed.) I, 34, pl. 18, fig. 1; var. *limbalis* Lec. Ann. Lyc., IV, 177. *limbalis* Klug, Jahrb. I, 29. *spretta* Lec. Ann. Lyc. IV, 177, pl. 13, f. 7. *amaena* Lec. Ann. Lyc. IV, 177, pl. 13, f. 3. *splendida* Hentz, Trans. Am. Philos. Soc. III, 254, pl. 2, f. 3. *seaguttata* var. Fab. Syst. El. I, 241. *marginalis* var. Dej. Spec, V, 210.

Formosa Say. Red cupreous, shining margins, beneath metallic blue; head granulate rugose, hairy; thorax broader than long, granulate; the humeral lunule, the middle fascia and the apical lunule broad, connected at margin, the middle band is usually only obtusely bent, not much deflexed, but it varies in shape. Occurs in Kans., Tex., Col. Length 17—18 mm.

Var. **generosa** Dej. Brown æneous opaque, beneath green. Resembles in every respect *formosa*, but in this species the middle band is usually rectangularly bent. In some specimens the tip of the humeral lunule nearly reaches the angulation of the middle band. Occurs in N. Y., N. J., Penn., Mo., Ky., Col. Length 16.5—18 mm

Var. **venusta** Lec. Cupreous opaque, beneath bluish-green shining. Differs only by being more slender and convex. Occurs in New Mex. Kans., Nebr., Dac. Length 13—15 mm.

Say, Trans. Am. Philos. Soc. 1818, I, 422. Am. Ent. I, 35, pl. 18, f. 2. Dej. Spec. II. 424. Lec. Ann. Lyc. IV, 180. *generosa* Dej. Spec. V, 231. Gould Bost. Journ. I, 42, pl. 3, f. 2. *venusta* Lec. Ann. Lyc. IV, 179, pl. 13, f. 5.

Latesignata. Brownish black, beneath green, head granulate rugose, hairy; labrum short, three-toothed; broader than long, scarcely narrowed behind, little convex, sides hairy; elytra strongly punctured, humeral lunule obliquely prolonged, middle band rectangularly bent, expanded at margin, connected with humeral lunule, apical lunule anteriorly inflected. Many specimens have the markings very broad confluent. Less convex and the elytra more strongly punctured than *generosa*, Occurs in California (San Diego). Length 23 mm.

Leconte, Ann. Lyc. 1852, V, 172,

Willistoni Lec. Bronzed brown, beneath metallic green or blue: head rugose, smooth; labrum with acute tooth at middle; thorax rugose, hairy at the sides, scarcely narrowed behind, elytra strongly punctured with a broad lobed white margin and refracted wide band, the descending portion of which is long and hooked very near to the terminal lunule; humeral lunule not at all oblique, bead of side margin dark metallic. Some specimens have bluish or green reflections in the impressions of the thorax. It seems to be a variety of *fulgida* but its surface is less smooth and shining and it differs also by the pattern of the markings, and is also somewhat broader and less convex. Occurs in Wyoming on alkaline mud. Length 10.5—14 mm.

Lec. Bull. U. S. Geol. and Geogr. Survey, 1879, V, 507,

Fulgida Say. Red cupreous, brilliant, highly polished, beneath hairy green; head rugose hairy and green in front; labrum short three-toothed; thorax rugose, impressed lines blue; elytra densely and strongly punctured, a dilated, humeral lunule, a broad refracted middle band and apical lunule. In some specimens the middle band of the elytra is slightly dilated along the margin, but never united with humeral or apical lunules. Form more slender than that of the preceeding ones. Occurs in Kans., Nebr., Dak., and Cal., on the upper banks of rivers at some distance from the water among the buffalo grass.

Say, Journ. Ac. Phil. 1823, III, 141, Lec. Ann. Lye. IV, 179, pl. 13, f. 5.

Senilis Horn. Black, opaque, beneath green; head hairy, granulate rugose; labrum obsoletely three-toothed; thorax short, slightly narrowed behind; elytra behind the humeri gradually broader, markings broad, a humeral lunule obliquely prolonged, the middle band enters at a right angle to the margin, and bends rectangularly, the longitudinal portion being longer, apical lunule. Occurs in Cal. (San Diego) Nev., Utah. Length 12 mm.

Horn. Proc. Ac. Phil. 1866. p. 395.

Hyperborea Lec. Dark cupreous, beneath green; head rugose, striate, and scarcely hairy in front; labrum short, one-toothed; thorax subquadrate, little convex, densely rugose, sides hairy; elytra behind the base a little broader, granulate punctate, humeral lunule obliquely prolonged, sometimes so as to touch the angle of the middle band: behind the lunule is a white margin which extends to the tip, obtusely dilated near the tip where it represents the apical lunule; the middle band arises perpendicularly from the white margin, bends backwards at an obtuse angle, runs obliquely nearly to the suture and ends opposite the dilatation of the white margin, the hind part of the band is straight and gradually clavate. In some specimens the marginal line is interrupted in front of the apical lunule, which thus becomes isolated. The markings of this species vary in their width, in Dr. Leconte's cabinet two specimens have the humeral lunule and the middle band so expanded as to become confluent and by these varieties it was shown that *Cic. limbata* || Say was also but a variety of *hyperborea*, while it bears a quite different aspect compared with the typical *hyperborea*. Occurs in Hudson Bay Territory and Oregon, Length 12 mm.

Var. *limbigera* Gemm. & Harold Catalogus p. 20, *limbata* || Say. Head and thorax green with cupreous tinge; elytra white, suture, oblique line and dot green, blue or cupreous, exterior and basal edge greenish blue, beneath blue. Head hairy rugose; thorax hairy rugose, little convex; elytra punctured, smoother than in *hyperborea* with a long sutural triangular macula, a small dot before the middle, and an oblique irregular line behind the middle, these markings are brilliantly shining either green or blue or cupreous. This insect was like the *Amblychila* lost for a number of years, till Mr. E. P. Austin recovered it on sandy hills in Nebraska a few years ago. Length 12 mm.

Gemminger & Harold in their Catalogus changed Say's name *limbata* into *limbigera*, as there was described and published in the same year (1823) another *Cicindela limbata* by Wiedem. Zool. Mag. II, I, p. 64, and it may be difficult to prove that Wiedemann's description was first published. Besides this Chaudoir gave Wiedemann's species in 1852 the name *tetraspilota*, so it was unnecessary to change in 1866 Say's name into *limbigera*; if this view should be adopted, the present species would of course stand *limbata* Say, var. *hyperborea* Lec.

Lec. New Spec. 1863, I, 1. *limbigera* Gemm. & Har. Catal. p. 20. *limbata* || Say, Journ. Ac. Phila. 1823, III, 142.

Ancocisconensis Harris. Brown bronze, beneath green, head granulate hairy; labrum long, three-toothed; thorax granulate, broad; elytra punctured with a scarcely curved humeral lunule, a short middle band obtusely bent, dilated at margin, apical lunule anteriorly inflected. This species is very distinct from all other native species; the peculiar markings resemble somewhat in form those of *repanda*. Occurs in New York, Pa., Ills., N. H. Length 15 mm.

Harris, Family Visitor (Cleveland, Ohio,) 2. No. 39. Haldeman, Proc. Ac. Phila., VI, 361.

Vulgaris Say. Brown bronze, opaque, beneath green, head granulate rugose, hairy; labrum short, three-toothed; thorax granulate rugose, short; elytra punctured, little granulated, humeral lunule oblique, very much prolonged, middle band narrow, rectangularly bent but little extended at the margin, apical lunule normal, some specimens have a greenish tinge. Occurs in almost every part of the United States, N. Y., Cal., Or., Can. Md., Kans., Ky. Length 13—17 mm.

Var. *vibex* Horn. Green shining, beneath bluish; head granulate rugose, hairy; labrum three-toothed; thorax short, granulate rugose, elytra punctured, granulate; humeral and apical lunules interrupted, the middle band not reaching the margin. Occurs in Or., Wash. Terr., Cal. Length 12—13 mm.

Var. *obliquata* Kirby. Greenish, cupreous (or brown), beneath bluish green; labrum three-toothed; elytra with a large white humeral lunule, extended at the lower end obliquely beyond the middle, middle band bent downwards, recurved at the end, and connected by a marginal line with the apical lunule. Kirby says in his description: Many taken in the Expedition, and apparently abundant in N. America etc. Mr. A. Murray from London sent to Dr. Leconte a drawing of which a wood-cut was published in Proc. Ac. Phila. 1866, p. 362, of which we bring a copy fig. 128. I have four specimens from Nebr. and Can. with much heavier markings than *vulgaris* and in each the middle band is posteriorly prolonged at the margin, but none reaches the apical lunule. Length 13 mm.

Say. Trans. Am. Phil. Soc. 1818, n. s. l. 409, pl. 13, f. 1, Lec. Ann. Lye. IV, 179. *obliquata*, Dej. Spec. I, 72. *tranquebarica* Herbst. Col. X, 178, pl. 171, f. 12, (wrong locality.) *vibex*, Horn. Proc. Ac. Phila. 1866, p. 395, *obliquata*, || Kirby. Faun. Bor. Am. IV, 10.

Repanda Dej. Brown bronze with green hue, beneath green; head granulate, hairy; labrum short, one-toothed; thorax nearly square, granulate; elytra punctured, granulate, humeral lunule C shaped, middle band rectangularly bent, connected with a marginal line nearly but never entirely reaching the lunules, apical lunule inflected anteriorly. Occurs on roads, fields etc. in New York, Can., Pa., N. J., Mo., Ga., Md., D. C., Or., Ky. Length 12—13 mm.

Var. *oregona* Lec. Brown bronze or dull olive green, beneath bluish; head and thorax as in repanda; elytra especially of ♀ broader, lunules broad, interrupted, middle band not dilated at margin, bent at a right angle and then curved towards the suture, terminating in a round dot; the white dots are always large and conspicuous. Occurs in Cal., Or., Wash. Terr. Length 11—14 mm.

Var. *guttifera* Lec. Brown bronze, beneath green bronze, with the pleurae cupreous, or the head and thorax green, elytra blue with the same markings, as *oregona*, a little broader, the middle band is not at

all dilated on the margin and the spots into which the lunules are divided are completely isolated. Occurs in New Mex. and Arizona. Length 12—13.5 mm.

Var. *duodecim-guttata* Dej. Black, brown or bluish, beneath green or blue with cupreous pleurae; head and thorax as in the above species; labrum one toothed; elytra granulate and punctured; humeral, post-humeral, anteapical and apical dots, all small, middle band thin not reaching the terminal (discal) dot. Varies considerably not only in the color as stated above, but also in the spots which are sometimes scarcely visible and nearly obsolete; the markings of the middle band are often small and imperfect, the sculpture also varies as in the black specimens, the punctures vanish and the elytra seem only sparsely granulate. Occurs on paths through marshes near ponds and rivers in New York, Lake Sup., Hudson Bay Terr., Can., Col., Utah, Cal. Length 12.6—15 mm.

Dej. Spec. I, 74; *baltimorensis*, Lec. Trans. Am. Philos. Soc. XI, 25; *hirticollis* Say. Journ. Ac. Phila. I, 20, Gould Boston Journal I, 49. *oregona* Lec. Trans. Am. Philos. Soc. XI, 41. *proteus* Kirby. Fauna. Bor. Am. IV. 9.. *guttifera* Lec. Trans. Am. Philos. Soc. XI, 42. *duodecim-guttata* Dej. Spec. I, 73.

Pusilla Say. Black opaque, beneath dark blue or greenish; tibiae pale at base, in some specimens the trochanters are also testaceous, head granulate, labrum three-toothed; thorax at disc smooth, rough at the margin; elytra sparsely and finely punctured, with a basal and apical faint lunule and a middle band extended at the margin, recurved at the middle of the elytron and terminating near the suture behind, the band is often obsolete, or only detached portions of it are visible, the enlarged marginal part is permanent. Occurs on moist mud in Kans., Nebr., Dac., Hudson Bay Terr., Cal. Length 12 mm.

Var. *terricola* Say. Black above and beneath, tibiae dull testaceous. Head and thorax as in *pusilla*; labrum broad, three-toothed; elytra with scattered very minute punctures, which are oblique as if formed by a pointed instrument directed towards the anterior part of the insect, so that the surface before each puncture is a little elevated. Occurs in Nebr., Hudson Bay Terr. Length 11 mm.

Var. *cyanella* Lec. Dark blue, sericeous, beneath blue; head striate both sides, labrum short, faintly three-toothed, thorax nearly longer than broad, hairy; elytra strongly punctured, with a humeral and an

apical lunule and a small submarginal dot at the middle. Has the same markings as *pusilla*, but differs by having the elytra with deeper and larger punctures. In the description of the species Leconte states that the elytra are fuscous and the anus and trochanters are testaceous, but in my specimens determined by Leconte as *cyanella* the elytra and anus are dark blue, and the trochanters purple. Occurs in Kans., Nev., Nebr. Length 9—10 mm.

Say. Journ. Ac. Phila. 1817, I, 21; Trans. Am. Philos. Soc. new ser. I, 424. pl. 13, f. 12. Dej. Spec. II, 432, Lec. Ann. Lyc. IV, 183. *terricola* Say, Long's Exped. II, 268. *cyanella* Lec. Trans. Am. Philos. Soc. XI, 46.

Hirticollis Say. Dull brownish cupreous, sometimes with green tinge, beneath green, very hairy. Head finely rugose and granulate, hairy, labrum short one-toothed; thorax finely rugose and granulate, very hairy; elytra strongly punctured with intermixed granules, the posterior part of the humeral lunule is perpendicularly inflexed and bent upwards, the middle band is as in *repanda*, connected by the marginal white line, with the humeral lunule and very often with the apical too, but there is usually a very small interstice between the marginal line and the apical lunule. Occurs on the shores of the Atlantic and Pacific Ocean, and the Gulf of Mexico; on Lake Ontario, Erie and Superior, and also on the rivers of the Central and Western States. Length 14—15.5 mm.

Trans. Am. Philos. Soc. new ser. 1818, I, 411. pl. 13, f. 2. *albohirta* Dej. Spec. II, 425. Spec. V, 215. *gravidula* Lec. Ann. Lyc. V, 170, Chaud. Bull. Mosc. 1854, I, 113. *unita* Kollar, Ann. Wien. Mus. I, 330, *ponderosa* Thoms. Arc. nat. 1859, p. 89.

Cinctipennis Lec. Brown, green or black, beneath black or green; head glabrous; labrum short with one prominent and two obsolete teeth; thorax finely granulate, hairy; elytra subparallel, strongly punctured, with white line on the submargin, separated from the margin by a narrow black stripe, dilated towards the apex, with narrow humeral and middle branch both descending obliquely, the latter sinuate. It varies by having the markings more or less slender. The trochanters are sometimes testaceous. Occurs on muddy plains near rivers in Nebr., Kans., Mont., Col., Cal., Wash. Terr. Length 11—12 mm.

Var. *imperfecta* Lec. Brown, beneath dark blue; elytra with a humeral lunule descending obliquely, an oblique, subsinuate stripe at the middle, distant from the margin, and nearly descending to the apex, and an apical lunule. In some specimens the posterior portion of the humeral lunule is connected with the anterior portion of the middle stripe. Occurs in Cal. Or. Nev. Length 11–12.5 mm.

Lec. Ann. Lyc. 1848, IV, 182, pl. 14, f. 12, *imperfecta*, Lec. Ann. Lyc. V, 171.

Rectilatera Chaud. Dark brown, beneath blue; head glabrous, finely granulate; labrum one toothed; thorax quadrate alutaceous, obsoletely transversely rugose; elytra not deeply punctured, very indistinct subsutural foveæ; with 5 round white dots, one humeral, three submarginal and 1 discal: the species is quite constant in its markings, and remarkable for having the apical lunule of the elytra represented only by a large submarginal dot, while the terminal part, or lunule proper, is entirely wanting. Occurs in Texas and Mexico. Length 13–13.5 m.

Bull. Mosc. 1843, IV, 693. *texana*, Lec. List of Coleoptera.

Tenuisignata Lec. Brown bronze, beneath metallic green; head glabrous, finely granulate, labrum one-toothed; thorax short, subcylindric, finely granulate, hairy; elytra punctate, sparsely granulate near base; with long slender markings, humeral lunule curved, middle band slightly bent, oblique, connected with a white marginal line, which is longer posteriorly but reaching neither lunule, apical lunule normal. Occurs in New Mex., Tex., Mex. Length 11.5 mm.

Lec. Ann. Lyc. 1852, V, 171.

Punctulata Oliv. Dark brown or black, beneath blue; head and thorax somewhat bronzed, finely granulate-rugose; labrum one-toothed; elytra oblong, strongly and densely punctured with a row of large bluish foveæ near the suture with several small white dots, four marginal and two discoidal, and a complete apical lunule, inflected anteriorly, forming there a sharp right angle. Legs long and slender. There are some variations in the southern States which have dots nearly connected by faint hair-lines and thus show the shape of the humeral lunule and middle fascia. Occurs from Maine to Texas, and New Mexico. Length 12.5–15 mm., on dry roads or sandy spots, frequently seen in the streets of cities.

Var. *micans* Fab. Green or blue, head and thorax sometimes dark bronze, with the same markings as *punctulata*.

Oliv. Ent. II, 33. p. 27, pl. 3, f. 37, a. b.; Fab. Syst. El. I, 241; Dej. Spec. I, 101; Say. Trans. Am. Philos. Soc. new ser. I. 420, pl. 13, f. 11; Herbst, X. 180. pl. 172, f. 2. *micans*, Fab. Syst. El. I, 238, Ent. Syst. Suppl. p. 61.

Tortuosa Dej. Brown or slightly greenish bronze, beneath green or blue. Head and thorax finely granulate, thorax sub-cylindrical; labrum one-toothed; eyes large prominent; elytra dispersedly, deeply punctured with a subsutural row of punctures, the markings are all very slender, the humeral lunule is terminating in a small line, forming a double hook (or often only thickened at the end), the middle band is very tortuose, very narrow and long, forming a kind of S, the apical lunule is also very narrow, and recurved anteriorly towards the suture. Legs moderately long and slender. This species has a very great range and varies in having the elytra more or less densely or deeply punctured, the thorax a little more or less distinctly finely granulate and the white markings more or less slender and broken.

This species was by some Entomologists considered as the *C. trifasciata* Fab., but the description does not fit the species and figures of it given by Olivier and Herbst do not all resemble it; besides Fabricius writes Ent. Syst. I, 177, "Habitat Italia paullo minor" and there is certain no variety "a little smaller" found in Italy. C. J. Schönherr Syn. Ins. 1805 p. 245, says "according to Illiger the smaller variety from Italy is without any doubt *C. sinuata*, Fab. Syst. El. I, 234.—Dejean Spec. I, 85, says under *C. trifasciata* Fab." it is possible that this species is not the same described by the author. As Dejean ascertained some of Fabricius' typical species, it seems that *trifasciata* was already lost at his time and the name should be dropped. Occurs on the seashore of La., Fla., Cal., Tex., also on the mud of rice-fields in Ga., La. Length 11.5–13 mm.

Dej. Spec. I, 87. *serpens* Lec. Ann. Lyc. V, 173, *trifasciata* Klug Jahrb. I, 21. Lec. Ann. Lyc. IV, 181. pl. 14, f. 10. *ascendens* Lec. Ann. Lyc. V, 172; *signoidea* Lec. Ann. Lyc. V, 172.—Chaud. Bull. Mosc. 1854. I, 113.

Dorsalis Say. Head and thorax bronze somewhat greenish, finely rugose, front bald, scutel green; elytra white, irregularly punctured, suture green, markings also green or bronze consisting of a lunulated branch on each elytron, terminating at the middle of the base; disc with two abbreviated line of which the anterior is curved outwards and

the posterior inwards, respectively terminating at one of the ends opposite the centre of the other. Beneath bronze, densely clothed with white hair. The ♀ has the thorax dilated posteriorly, and the elytra behind the humeri distinctly angulated. Legs very long. In some specimens the markings are less perfect or even wanting, then only the suture, head and thorax are green or bronze. Occurs on the open sandy seashore of Rockaway, Coney Island and Jersey.

Length 14.5–15 mm.

Say. Journ. Ac. Phil. 1817, I, 20; Trans. Am. Philos. Soc. I, 415, pl. 13, f. 5, *signata* Dej. Spec. I, 24.

Var. *media* Lec. Resembles *dorsalis* in every respect except in size, it is shorter and narrower, has the same markings and there are also variations with immaculate white elytra. Occurs on the seashore of Ga., S. C., N. C., Fla. Length 13–14 mm.

Leconte Trans. Am. Philos. Soc. 1856, XI, 47.

Var. *Sauleyi* Guerin. Also of but smaller size, with the markings heavier. Also white variations found with only the suture of the elytra bronzed. Found on the seashore of the Gulf of Mexico, (Tex. La. Fla.) Length 9.4–11 mm.

Guerin Rev. Zool. 1840, p. 37, *venusta* Laf. Rev. Zool. 1841, p. 37 and 96.

Hamata Brulle. Brown or dark green bronze, beneath green bronze, very hairy at the sides. Head and thorax hairy, mentum one-toothed; right mandible of male with a feeble tooth beneath, elytra broad, densely punctured, the markings are a basal dot oblique, humeral lunule, middle band refracted with descending part confused, the apical lunule is lost in the white margin which connects the middle band with both lunules, but is slightly dilated at the suture and at the anterior extremity; eyes large prominent, legs very long and slender; hind trochanters red, as in all the species of this group. The sexual difference consist beside in the mandibular tooth of the male, in the shape of the elytral apex, as stated in the synoptic table (see pl. IV, f. a.) Occurs on the seacoast of La. Fla. Miss. Tex. Length 11–12 mm.

Brulle, Arch Mus. I, 132, pl. 8, f. 9, *lacerata* Chaud. Bull. Mosc. 1854, I, 115.

Marginata Fab. Olivaceous or brownish bronze, beneath green bronze, very hairy at the sides. Head and thorax hairy, labrum one-toothed; right mandible of ♂ with a moderated tooth beneath; elytra

densely punctured, with basal dot, an oblique humeral lunule hooked at tip, a slender long tortuose refracted confused middle band; apical lunule inflected on both ends, all the markings are connected by the white margin. Eyes and legs as in *marginata*, from which it only differs by the stronger mandibular tooth, and differently shaped elytral apex, as stated in the synopsis and on plate IV, b. Occurs on the salt-marshes in New York, Mass. and on the ocean-beach of S. C., N. C., Ga., Fla. Length 13.5-14.8 mm.

Fab. Syst. Ent. p. 226, Say Trans. Am. Philos. Soc. new ser. I, p. 417, pl. 13. f. 6. *variegata* Dej. Spec. I, 84.

Cuprascens Lec. Coppery or greenish bronze, shining, beneath green bronze, very hairy at the sides. Head and thorax hairy, labrum short one-toothed. Elytra more coarsely and densely punctured, with basal dot, white lobed margin, a humeral lunule suboblique hooked at tip, a middle band somewhat tortuous and little confused before tip, which is dilated, and an apical lunule inflected at both ends. It differs from the two following species by the characters given in the synoptic table page 83, viz. punctuation of the elytra, and the shape of the apex pl. IV, f. c. Occurs in Mo., Kans., Nebr., Dac. Length 13-14 mm.

Lec. Proc. Ac. Phila. 1852, p. 65. *blanda* var. Lec. Ann. Lyc. IV, 180.—Chaud. Bull. Mosc. 1854, p. 172.

Puritana Horn. Brown bronze, beneath metallic blue, smooth shining, scarcely pilose. Head and thorax sparsely pilose; labrum one-toothed; elytra parallel, moderately densely punctured, a median basal white dot, lateral margin narrowly bordered with white, with oblique sub-humeral branch suddenly hooked at tip, at middle a slightly sigmoid band, somewhat confused at middle, and scarcely dilated at tip, and an oblique short subapical lunule. It differs from the preceding and following species as stated in the synoptic table, having the color and sculpture of *macra* and the sexual characters very nearly of *cuprascens*. Occurs in New York, New Hampshire and Mass. Length 11.5 mm.

Horn, Trans. Am. Ent. Soc. 1871, III, 325.

Macra Lec. Brown bronze with faint greenish tint, beneath bronze or greenish bronze, densely pubescent at the sides. Head and thorax pubescent; labrum one-toothed; elytra finely and more sparsely punctured; the markings are about the same as in *cuprascens*, the tip of the middle fascia being also dilated into a broad triangular spot. It differs

by the characters given in the synoptic table p. 83 and pl. IV, f. d. It is also usually more slender, less shining and has the markings of the elytra narrower than *cuprascens*. Occurs in Ills., Kans. Wisc., Minn. Length 13—14.2 mm.

Lec. Trans. Am. Philos. Soc. 1856, XI, 50; *blanda* † Lec. Ann. Lyc. IV, 180.

Wapleri Lec. Elongate, slender, allied to *cuprascens*, with the elytra equally coppery and deeply punctured; side margin broadly white; basal spot small, humeral lunule curved, not hooked behind; median band suddenly refracted and hooked, not extending for backwards, and not curved in a sigmoid manner as in *cuprascens*, white lobe representing apical lunule very broad, obtuse. Thorax cylindrical, rather less rounded at the sides than in *cuprascens*; elytra obliquely broadly subsinuate near the tip. ♀ not seen. Occurs in Miss. Length 10 mm.

Lec. Trans. Am. Ent. Soc. 1875. V. 158.

Blanda Dej. Above green, beneath brilliant bronze green; Dejean compares it with *variegata* (*marginata*) and says: It is smaller, lighter green, elytra narrower and more parallel, especially in the ♀, less deeply punctured, the lateral margin is broader especially near the apex, the humeral lunule is larger, not sinuate, united with the basal dot; the middle band is nearly as in *tortuosa*, but broader and a little toothed at the sides, the apical lunule is entirely consumed by the broad white margin. Labrum short, one toothed; hind trochanters rufous. The elytra appear white, only a dark narrow sutural stripe with four branches being left. The female has no tooth near the tip of the elytra and the sinuation is very feeble. pl. IV, fig. f. It is very rare. Locality reported Georgia & North Carolina. Length 11—12 mm.

Dej. Spec. V, 238; *tarsalis* Lec. Proc. Ac. Phila. VI, 66.

Nevadica Lec. Coppery bronze, beneath green. Head large, eyes less prominent, front sparsely hairy, labrum not distinctly toothed; thorax nearly cylindrical, finely rugose, sides hairy. Elytra deeply but not coarsely punctured, markings not connected at the margin, humeral lunule slightly oblique not hooked at tip, middle band with short, feebly sinuous longitudinal portion, apical lunule broad, not prolonged in front. Elytra of ♂ broadly subsinuate near the tip, of ♀ strongly sinuous, the anterior angle of the sinuation rounded. Occurs in Nevada. Length 11 mm.

Lec. Trans. Am. Ent. Soc. 1875, V, 159.

Sperata Lec. Brown cupreous, beneath green. Head and thorax pubescent; labrum one toothed; elytra densely punctured, white margin, humeral lunule oblique, hooked at tip, middle band with long, moderately sinuous longitudinal portion, apical lunule inflected on both ends, anterior end moderately prolonged. Elytra of ♂ slightly sinuous near tip, the latter acute with sutural spine, of ♀ rather strongly sinuous and with a distinct angulation, tip less prolonged but also with sutural spine. Occurs in New Mexico. Length 12—13.5 mm.

Lec. Trans. Am. Philos. Soc. 1856. XI, 50.

Gabbii Horn. Olivaceous bronze, beneath green bronze, very hairy. This species is very singular and at once known by its peculiar markings; the humeral lunule is obtusely bent and hooked at tip, the middle band curves towards the base and is suddenly bent at an obtuse angle and obliquely prolonged towards the suture and to nearly the apical lunule, connected at the margin with the apical and humeral lunules; the apical lunule is anteriorly very much prolonged. The labrum is one-toothed, the elytra strongly punctured, those of the ♀ are broader than those of the ♂, with the tips narrowing obliquely. Occurs in California on salt marshes near Wilmington (San Petro) Cal. Length 11—12 mm.

Horn, Proc. Ac. Phila. 1866, p. 395.

Hirtilabris Lec. Bronzed-brown, body beneath, prothorax and head clothed with prostrate white hair, labrum clothed with similar white hair with a small indistinct tooth at the middle. Elytra with a broad white border, feebly dilated in the region of the humeral lunule, middle band broad, marked with numerous dark points and lines, immediately behind it is a dilation representing the apical lunule, there is also a small basal spot. The dark spaces are strongly punctured. Legs very long and slender, hind trochanters red. It is remarkably distinct from all the other species by the labrum being clothed with fine prostrate white hair. Elytra of ♂ feebly sinuate, tip obtuse, of ♀ deeper sinuate, limited in front by a distinct angulation, tip obliquely truncate, pl. IV, fig. g. Closely resembles *gratiosa*, but it is sufficiently distinct by the hairy labrum, the dark space of the elytra broader, with the two branches more confused. Occurs in Florida, on sandy roads through meadows. July to Sept. Length 9—9.5 mm.

Lec. Trans. Am. Ent. Soc. 1875. V, 161.

Gratiosa Guerin. Head and thorax brown bronze, densely pubescent. Elytra white, the suture bronze brown, dilated at base with two sharply defined branches on each side. Very close to the preceding, but it has the labrum glabrous, and the sutural dark space and branches narrower and better defined. Occurs in Fla., Ga. and S. C. Length 10.5—11 mm.

Guerin. Rev. Zool. 1840, p. 37.

Lepida Dej. Head and thorax green bronze, hairy; elytra white, glabrous, dispersedly punctured, with a few green or brown bronzed dark lines as given in fig. 90; suture pale; beneath green bronze, densely clothed with white hair; anus testaceous; legs antennæ and palpi pale, the latter brown at tip; labrum one-toothed. Elytra of ♂ scarcely sinuate and obliquely narrower at apex, of ♀ sinuate, exterior angle obtuse not rounded apex nearly truncate. Occurs on Coney Island near New York, at Trenton, N. J., and Ills., Tex. Col., Iowa, Kans. and Mo. Length 11—12.5 mm.

Dej. Spec. V, 255. Lec. Ann. Lyc. IV, 181, pl. 13, f. 8.

Viridisticta Bates. Subcylindric, opaque, brown cupreous with green or shining cupreous with impressions, beneath polished blue, glabrous; head narrow, base broad finely strigose and vermiculate-rugose, labrum three-toothed; thorax cylindric, little narrower at base, finely strigose; elytra oblong with shallow punctures and foveæ, lateral margin broadly polished; a white triangular spot near middle of margin and a narrow complete apical lunule. Occurs in Arizona and Mexico. Collected last year by Mr. Morrison. Length 6.5 mm.

Bates, Biologia Centrali Americana 1881, I, part 1, page 14, pl. 1, fig. 20.

Chaud. Cat. Coll. Cic. 1865, No. 29, page 23 (only mentioned but not described therefore the species must be cited *viridisticta* Bates.)

Lemniscata Lec. Shining cupreous, beneath bluish-green. Head glabrous, eyes large prominent; labrum obsoletely three-toothed; thorax cylindrical, granulate, rugose, slightly hairy at the sides; elytra strongly punctured, coppery shining, with a white vitta far removed from the margin and slightly lobed internally, extending from the base to the tip where it bends around to the suture. Legs red. Occurs in New Mex., Ariz. Length 7.5—8 mm.

Lec. Ann. Lyc. V, 173.

Circumpicta Laf. Green or bluish or dark brown, beneath dark green bronze, densely pubescent at the sides. Head scarcely rugose; granulate, glabrous; labrum three-toothed; thorax very shining, convex, much rounded at the sides, little rugose nearly smooth; elytra nearly parallel in both sexes, strongly punctured, especially near base, with a broad white margin, more or less lobed internally to indicate the posterior portion of the humeral and the anterior portion of the apical lunule and the middle fascia. Eyes very large and prominent, tarsi of ♂ very slightly dilated; anus dark piceous or testaceous. Two specimens in my collection determined by Dr. Leconte as *praeextata* Lec. do not differ from the dark brown variation of *circumpicta* Laf., except that the oblique middle band is more prolonged; but I have specimens of *circumpicta* which are brilliantly green above with the same middle bands. *C. californica* Menetries, differs only by having the lateral margin of the elytra interrupted before the apical lunule. Occurs in Tex., New Mex., Ariz. Length 14—14.5 mm.

Laferte, Rev. et Mag. Zool, 1841, p. 39 and 193. *Johnsoni* Fitch, New York Agr. Soc. 1856, p. 487.

Togata Laf. Brown cupreous with slight green tinge, beneath green, densely pubescent at the sides. Head red cupreous, pilose; labrum one-toothed; thorax subquadrate, deeply impressed, little hairy; elytra flat, ovate in ♀, nearly parallel in the ♂, distinctly punctured, near the suture a row of cupreous punctures, white margin, three lobed, very broad, so as to leave, only a dorsal (sutural) broad greenish cupreous space; the apex of ♂ is conjointly, of the ♀ separately rounded. Eyes very large and prominent, anus testaceous. Occurs in Nebr. and Texas. Length 10—12.5 mm.

Laf. Rev. et Mag. Zool. 1841, p. 40-

Pamphila Lec. Of nearly the same form as *togata*, but shorter, stouter, flatter. Color above olivaceous opaque, beneath brilliant green. Head green shining, bald, deeply and broadly striate at the sides, rugose at middle, labrum white, one-toothed; thorax granulate, rugose, hairy, convex, sides rounded, feebly constricted behind, hind angles rectangular, prominent; elytra with very broad white margin, humeral lunule but little protruding, middle band long, oblique, nearly reaching the suture, hooked at tip, the anterior portion of the apical lunule deeply cutting into the dark sutural space, which is

coppery at middle and strongly punctured, while the white markings are nearly smooth. Along the green lateral margin of the elytra are a few green punctures. Eyes very large and prominent, legs very long and slender, anus and hind trochanters testaceous. Elytra scarcely serrate at tip, which is slightly prolonged and has a sutural spine in the ♂ and is equally rounded in the ♀. Occurs in Tex. and La. (Miesche). Length 10.5—11 mm.

Lec. Proc. Ac. Phila. 1873, p. 321 (Short notice.) Chaud. Cat. Coll. Cic. 1865, p. 28, No. 130 (only the name).

Severa Laf. Dark green or black, beneath green, sparsely hairy at the sides. Head glabrous, nearly polished, deeply striate at the sides; labrum short, broad, acutely three-toothed; thorax scarcely rugose almost polished, impressions not deep; elytra near base strongly, toward apex more obsoletely punctured, with a deep longitudinal impression behind the humeri and a row of more or less distinct foveæ near the suture; the markings consist of a white sub-marginal dot and a complete apical lunule; in some specimens there is an additional sub-marginal white dot, representing the terminal part of the humeral lunule. Eyes large, legs shorter, stout, anus dark or testaceous, elytra of ♀ somewhat flatter. Occurs in La., Tex., New Mex. Length 12.5—16 mm.

Laf. Rev. Zool. 1841, p. 41.

Striga Lec. In shape, color, and markings closely resembling *severa*, it differs by the deeper punctures of the elytra by the form of the labrum, which is without a tooth in the ♂, and only one-toothed in the ♀; the head not concave between the eyes. Although inclined to consider this species only a variety of the preceding, I can not say anything positively, as I could only examine two specimens superficially. Found in the twilight or night near camp-fires in Fla. (Lake Harvey) by Mess. Hubbard & Schwarz. Length 13.5—to 16.5 mm.

Lec. Trans. Am. Ent. Soc. 1875, V. p. 161.

Haemorrhagica Lec. Greenish black, beneath, head thorax dark green, abdomen rufous, scarcely hairy at the sides. Head finely granulate, glabrous; labrum one-toothed; thorax finely granulate, little hairy at the sides. Elytra not deeply punctured with a humeral white spot, a posthumeral near the margin, the middle band obliquely bent before the middle of the elytra, a marginal dot at the middle between the

middle band and the usually complete apical lunule, the anterior portion of the latter connected with a discoidal dot. Eyes moderate, legs stout, shorter. This species is easily distinguished from the other species with red abdomen by the shape of the middle band which descends less obliquely and has the terminal dot heavier.

Var. *pacifica* Schaupp. In size, shape and sculpture exactly agreeing with *haemorrhagica*, it differs only by the color of the elytra which are olivaceous, opaque greenish or bluish, head, thorax, margin, suture and apex of the elytra more shining, no markings at all. It occurs intermingled with the type equally numerous on the ocean shore in San Diego, Cal. while *haemorrhagica* is also found in Utah and Nev. Length 13—15 mm.

Lec. Ann. Lyc. V, 171.

Rufiventris Dej. Dark brown, head and thorax slightly bronzed above, and bluish green beneath, abdomen rufous. Head slightly granulate, glabrous; labrum one-toothed; thorax finely granulate; elytra finely punctured, with five small white dots, a humeral, a marginal behind the middle and two discoidal ones and an apical lunule, all more or less distinct. It differs from the following species by the dots of the elytra being very small and sometimes more or less wanting, the middle band is represented by two dots, the outer one being remote from the margin and not larger than the inner one. Eyes moderate, legs slender. Occurs in D. C., Va., W. Va., Ky., Md., Ala. Length 11.5—12 mm.

Var. *cumatilis* Lec. Differs from *rufiventris* by the bluish green surface, and has the same small more or less deficient markings. Occurs in Texas. Same size as the type.

Var. *16 punctata* Klug. Of the same color as *rufiventris*, differs from it by having an additional white dot representing the posterior portion of the humeral lunule, and the apical lunule broken at middle, so that each elytron has eight dots; which are heavier than in *rufiventris*. Occurs in New Mex. and Mex. Length 12 mm.

Dej. Spec. 1825, I, 102.—*cumatilis* Lec. Ann. Lyc. 1852, V, 173.—*Quexiana* Chev. Rev. Zool. 1853, p. 419.—*sedecimpunctata* Klug. Jahrb. 1834. p. 32.

Hentzii Dej. Dark, nearly black, beneath bluish green. In form and sculpture precisely similar to *rufiventris* and so closely connected that it might properly be considered a race of this species; it differs by the

darker color, the two dots of the humeral lunule being connected at the margin, the middle band reaching the margin and dilated into a short line, which extends forwards, the marginal dot behind the middle band is sometimes connected also with this line; finally, the under surface is blue and green without any admixture of copper. Occurs in Mass. Length 11.5—13 mm.

Dej. Spec. V, 428 (Heutzi) Lec. Ann. Lyc. IV, 182.—*haemorrhoidalis* || Hentz. Trans. Am. Philos. Soc. new ser. III, 254, pl. 2, fig. 2; Gould, Bost. Journ. I, 52, pl. 3, fig. 5.

Marginipennis Dej. Olivaceous or brown, beneath green, abdomen rufous. Head granulate, glabrous; labrum short, almost truncate, one-toothed; thorax cylindrical, finely granulate and rugose; elytra punctured with a white submarginal band reaching from the humerus to the apex, and lobed internally, slightly indicating the tip of humeral lunule and moderately the middle band and anterior portion of the apical lunule. Eyes moderate, legs stout, rather short. Found only on the shores of the Susquehanna, below the bridge at Harrisburg Pa., and of the Delaware, near Callicoon, N. Y., at the latter locality I took them in numbers. Length 11—14 mm.

Dej. Spec. V, 260, Laf. Rev. Zool. 1841, p. 193, Lec. Ann. Lyc. IV, 182, pl. 14, fig. 11.

Schauppia Horn. Head and thorax dark bronze; elytra velvety black, beneath metallic blue, sides of metasternum brilliantly cupreous, entire abdomen red. Head granulate, glabrous; labrum truncate at middle without a tooth; thorax slightly narrowed behind, sparsely hairy, slightly granulate. Elytra with velvety surface, smaller puncture. obsolete, a row of larger greenish punctures near the suture and other near the humerus, margin narrowly white, slightly dilated at the humerus and again behind it; median band reduced to a straight oblique line, apical lunule slightly prolonged in front. Eyes moderate and prominent, legs moderate. The elytra at tip are conjointly rounded, the suture slightly spinous. The species resembles in its markings *circumpicta* var. *praetextata*, but differs from it in size and the entirely red abdomen, also in the entire absence of any labrum tooth. Occurs in Texas, the first specimens were collected by my friend Mr. Emil Schorbach near Corsicana, Eastern Texas. Length 10.5 mm.

Horn. Trans. Am. Ent. Soc. 1876, V, 240.

Abdominalis Fab. Shining black, beneath blue nearly glabrous, abdomen red. Head glabrous, scarcely striolate at the sides, labrum large, white, rounded in front, scarcely toothed; thorax subcylindric, nearly smooth; elytra convex, obsoletely punctured with a row of bluish shallow foveæ, the markings are a very narrow apical lunule and a submarginal white dot near the middle and a discoidal one behind the middle, the dots are more or less distinct, sometimes even wanting. Legs long. Eyes large and prominent. Occurs in N. J., N. C., Ga., Ala., Fla. in pine forests. Length 9—11 mm.

Var. **scabrosa** Schaupp. Differs from *abdominalis* only by the very strong and deep punctures and foveæ of the elytra, so that the surface is quite variolous. Occurs with the type in Fla. Length 10.5 mm.

Fab. Syst. I. 237.—Herbst, Kaefer, X, 202.—Dej. Spec. I, 140.—Lec. Ann. Lye. IV, 183, pl. 14, fig. 13.

Politula Lec. Black somewhat shining, slightly tinged with blue and bronze on head and thorax, beneath and legs blue, abdomen ferruginous. Head smooth; labrum white, irregularly rounded in front, tooth obsolete; thorax finely rugose, not longer than wide, sides broadly rounded. Elytra convex, oblong, finely and densely punctured, tips rounded, obsoletely serrate, sutural spine very small, apical lunule represented by a short white line. It is of the size and general form of *punctulata*, but quite different by its characters. Occurs in Texas. Length 12 mm.

Lec. Trans. Am. Ent. Soc. 1875, V, 159.

Sommeri Mann. Dark cupreous, beneath cupreous or purple with the two last abdominal segments rufous; densely hairy at the sides. Head depressed between the eyes, finely coriaceous; labrum brown, obsoletely toothed; thorax quadrate flat, truncate at base, sides parallel, very subtle coriaceous; elytra dilated at the middle; the markings are broad, fulvous and consist of a humeral lunule, a middle fascia transverse, slightly oblique, from the suture to the margin where it is slightly dilated anteriorly, and of a round large dot representing the anterior portion of the apical lunule. Occurs in Mexico and Cal. (San Diego) teste Mr. H. Edwards. Length 13—14 mm.

Mann. Bull. Mosc. 1837, II, 12.—Chevr. Mag. Zool. 1841, p. 7.

(Reprint from *Trans. Am. Philos. Soc.* 1830. III, pag. 253-258.)

[253].

Description of ELEVEN NEW Species of NORTH AMERICAN INSECTS. By N. M. HENTZ, Professor of Modern Languages in the University of North Carolina.—Read November, 2d, 1827.

CICINDELA.

1. *C. denticulata*. Bright green; mandibles slender, longer than the head; elytra polished, with a subsutural series of impressed punctures, a subhumeral dot, intermediate triangular spot and terminal lunule white; pectus, postpectus, and front in the male, hairy.

Length half an inch. Inhabits Massachusetts.

From *C. 6-guttata* this species may be easily distinguished by its elongated mandibles, its pectus and postpectus very hairy, and the head also, in the male. The punctures on the elytra of this species are exceedingly minute and distant, whilst they are deep in *C. 6-guttata*. To Dr. T. W. Harris I am indebted for this and the next species. That gentleman, whose knowledge and labours are not less remarkable than his disinterestedness, has furnished me also with the following

Varieties.

a—Elytra purplish blue; spots as in the species.

b—Anterior dot of the elytra wanting. [254]

c—Anterior dot wanting; triangular spot reduced to a transverse line; posterior lunule interrupted so as to form a fourth spot.

d—Two anterior spots wanting.

e—All the spots wanting except the terminal lunule which is merely an abbreviated transverse line.

f—All the spots wanting and terminal lunule obsolete.

[This is *C. rugifrons* Dej., a variety of *C. scutellaris* Say.]

2. *C. haemorrhoidalis*. Hairy, dull cupreous or purple; elytra with a humeral dot, a round dot behind, a curved band, two dots behind, and a terminal lunule whitish. Deep purple beneath; venter ferruginous.

Length 9-20ths of an inch. Inhabits Massachusetts.

This beautiful little insect, also communicated to me by my excellent friend Dr. Harris, is very remarkable for its numerous markings, in all twelve, on the elytra. The head and thorax are marked with purple and green, the thighs are green, and the sides of the thorax, pectus and postpectus are hairy.

[This is *C. Hentzii* Dej., the name of *haemorrhoidalis* being preoccupied.]

3. *C. splendida*. Bright green; disk of the elytra crimson or purple, with a submarginal subtriangular transverse line near the middle, and a terminal transverse line; whole margin green.

Length 6-10th of an inch.

Inhabits North Carolina. Swarming in April.

This species is closely related to *C. marginalis* of Fab. *C. purpurea* of Olivier, and chiefly so to the variety *b* of Mr. Say; but several reasons have induced me to consider it as a distinct species. The thorax of *C. marginalis* is sensibly transverse, in this species it is less so, and with the head entirely bright green: *C. marginalis* is quite hairy, this is slightly so. The former inhabits usually shady places near or in the [255] grass; *C. splendida* is always found on barren dry clay or sand. The middle line is sometimes wanting, sometimes the terminal one is obsolete; and I have observed two specimens with a humeral whitish spot.

[This is a variety of *C. purpurea* Oliv.]

LEBIA.

4. *L. grandis*. Ferruginous; elytra purple, venter piceous; thorax remarkably transverse, posterior angles sharp, nearly rectangular.

Length rather more than 9-20ths of an inch.

Inhabits North Carolina.

The remarkable size of this species will be sufficient to distinguish it from *L. atriventris*, Say, which is very much resembles; but it is nearly twice as large, being, I believe, enormous for this genus. The head is darker than the thorax, and the striæ of the elytra are deeper than in *L. atriventris*. I have never seen but two specimens, found at night, attracted by the light.

5. *L. borea*. Head dark green; disk of the thorax, tarsi, lower ends of the tibia, knees, and anterior thighs, piceous; elytra green, substriate; postpectus and venter ferruginous.

Length rather more than 5-20ths of an inch.

Inhabits Massachusetts.

This insect cannot be mistaken for *L. tricolor* of Mr. Say. The striæ of the elytra cannot be seen by the naked eye, but with a lens they appear to be punctured and regular, though superficial. The margin of the thorax is ferruginous; the middle part of the tibia and upper part of the two posterior pairs of thighs are testaceous. The three first joints of the antennæ are ferruginous, darkening upwards, the rest are black.

[This is *L. viridipennis* Dej.]

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6. *L. solea*. Testaceous; elytra with deep impunctured striæ, a common sutural band narrower near the middle, not reaching the apex, to which it is contiguous on each side, with a submarginal band which tapers towards the humerus.

Length hardly a quarter of an inch.

Inhabits Massachusetts.

This insect is quite distinct from *L. vittata*, which is larger and differs from this in many respects. I cannot see that the interstice between the black bands has ever been white, as no trace remains of that colour as in *L. vittata*. The body and feet are testaceous; the head bordering on the rufous; the antennæ are dusky with paler base. The interstitial lines on the elytra are convex, which is not the case with *L. vittata*.

[This is *Dianchomena scapularis* Dej.]

MELOLONTHA.

7. *M. porcina*. Densely covered with short yellow hair; clypeus emarginate; head piceous or black with a few hairs; antennæ and legs ferruginous, thorax punctured, very hairy, with a longitudinal black line formed by the absence of hair; elytra castaneous, pubescent.

Length little more than one inch.

Inhabits Massachusetts.

This must be a rare insect, as I never saw but one specimen, and it was new to my friend Dr. Harris; the head and thorax are piceous or blackish, but the thorax is covered with so much yellow hair, that it gives it a pale greenish appearance. The hair which covers the insect is short except on the margin of the elytra and postpectus, where it is long.

[This is *M. ilicis* Knoch.]

8. *M. variolosa*. Covered with short white hair; clypeus subquadrate: broader at tip, entire, ferruginous; antennæ ferruginous, clava very long, seven laminae; thorax blackish with three obsolete longitudinal impressed lines obsoletely marked [257] with white hair; elytra dark castaneous, with suture, humeral line, and irregular spots, and the disk white; postpectus with thick long yellow hair.

Length very little smaller than the preceding.

Inhabits Massachusetts.

This cannot be referred to *Melolontha 10-lineata* of Mr. Say, which has its clypeus emarginate, and differs from it in other respects; both are in somewhat related to *M. fullo* of Europe. I never saw but 2 specimens.

[It is *Polyphylla variolosa* Hentz.]

PYROCHROA.

9. *P. ? infumata*. Black, hairy; head deep black, polished; antennæ and palpi ferruginous at base; thorax ferruginous, polished; disk black, elytra hairy, punctured.

Length nearly 3-10ths of an inch.

Inhabits Massachusetts.

[This is *Corphyra labiata* Say.]

10. *P. ? elegans*. Slightly hairy; head deep black, polished; thorax, palpi and legs bright yellow, polished; elytra blue black, punctured, with a terminal yellow spot, polished, raised and impunctured.

Length not quite 3-10ths of an inch.

Inhabits Massachusetts.

The two last insects answer well to the characters of *Pyrochroa* as given by Latreille and Lamarck, and cannot be referred to any other genus mentioned in the books. The palpi in both have their last joint larger, subsecuriform. The penultimate article of the tarsi is remarkably bifid. Their antennæ have subcylindrical joints, and are inserted into a groove of the eye.

[This is *Corphyra elegans* Hentz.]

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NEMOGNATHA.

11. *N. nemorensis*. Black, hairy; mouth and thorax ferruginous, with three basal impressions black; elytra punctured, substriate; suture raised.

Length 3-10ths of an inch.

Inhabits the woods of North Carolina.

This interesting insect is probably rare, for I never saw but one specimen, found in May. The second joint of the antennæ is shorter than the first and the third; and all the joints are very hairy. The maxillæ which are usually bent under are nearly as long as the antennæ.

In the above descriptions it is not unimportant to observe that Dr. T. W. Harris has found in the vicinity of Boston *Cicindela formosa*, which Mr. Say described from specimens brought from the Missouri by Mr. Nuttall. He and I have also found there *Clytus speciosus*, described by Mr. Say, in the Appendix to Long's Expedition of 1823, as discovered on the banks of the Wisconsin, Prairie du Chien. I have seen in North Carolina a number of insects which he had found only in the west.

SYNOPSES OF BUTTERFLIES.

APATURA, *Fabr.*

The species of this genus have broad trigonate primaries, produced at the apex, and with even external margins: the secondaries are somewhat narrow, and have the inner angle more or less produced in the males, but not so as to be caudate. The general color is livid or olivaceous brown varying in intensity in the specimens, and sometimes assuming a reddish tint. The outer half of the primaries is darker, maculate with white spots.

The species are closely related, and color and slight variation in maculation has been relied on, to separate the species heretofore described. There species are here recognized, and they may be distinguished as follows:

- Primaries with one or more large black extra discal spots (sometimes ocellate) surrounded by ground color.
- Ground color pale livid or olive brown, size moderate..... *celtis*.
- Ground color darker, more reddish brown, size larger..... *alicia*.
- Primaries with extra discal black spots, replaced by one or more clear white spots..... *clyton*.

A. celtis, Bd. Lec. Lep. Am. Sept. 210. t. 57, f. 3 & 4 larva and chrysalis. Edw. Butt. N. A. II, Pl. 1, *Apatura* f. 1, 2 & 3, (larva): *lycaon* Scudder, Syst. Rev. Am. Butt. 9, (1872):? *lycaon* Fabr. Ent. Syst. III, 1, 228.

Primaries near base, and secondaries olive brown; rest of fore wings blackish fuscous. Two rows of white spots on primaries: the first apical, consisting of three or four; the other discal and across the wing consisting of seven. One extra median black ocellus. Secondaries with six marginal ocelli; a discal band of white spots on male. Beneath, base of forewings reddish; else gray with spots and ocelli as above. Secondaries of ♂ prolonged at anal angle, of ♀ rounded. Larva subcylindric, tapering toward each end, anal segment bifid or furcate; head large, with two branched spines; color yellowish-green with whitish sides and bluish green longitudinal lines: incisures of segments darker; feeds on hackberry (*Celtis occidentalis*). Chrysalis green, shaped much like that of *Danaïs archippus*, head slightly bifid.

Butterfly expands 1.5—2 inches. *Hab.* East U. S.

Var. **antonio**, Edw. Field & Forest, III, 103 (1877).

Like *celtis* but with two extra discal black spots on primaries, which are pupilled with white or blue.

Size of *celtis*. *Hab.* Tex., Ariz., Col.

Var. **montis**, Edw. Papilio 3, 7.

Like *antonio* but with three ocellate black spots above on primaries; four or five below.

Size of *celtis*. *Hab.* Col., Ariz.

Mr. Edwards, Pap. III, 7, gives as a distinctive point between *celtis* and *antonio* that in *celtis* there is but a single *blind* ocellus in the second median interspace, while in *antonio* there is a second, in the upper median interspace and both are ocellate. *Montis* is described as a variety of *antonio* though it has one more ocellate spot above and a variable number beneath. I have seen in Philadelphia and elsewhere *celtis* with the spot very distinctly pupilled, and have seen *antonio*, with the pupils reduced to mere pale dots; the number of spots seems to afford no safe specific character and the insects are therefore placed as varieties of *celtis*.

A. alicia, Edw. Butt. N. A. I, pl. 1. *Apatura* (et larva).

Markings like var. *antonio* of *celtis*, but ground color of upper surface inclined to reddish tawny. The anal angle of the secondaries of the ♂ are more produced, and the specimens are as a rule considerably larger than any varieties of *celtis*.

Expands 2.5—3 inches. *Hab.* So. U. S.

Var. **leilia**, Edw. Tr. A. E. S., V, 103; Butt. N. A. II, pl. 1, *Apatura* f. 6 and 7.

More reddish in tint on the upper surface, apical dark space of primaries less contrasting, with three ocellate black spots, as in var *montis* of *celtis*.

Expands 2 inches. *Hab.* Ariz.

Alicia and *leilia* are probably but dark forms of *antonio* and *montis* and Mr. Strecker in his list catalogues them as varieties of *celtis*.

A. clyton, Bd. & Lec. Lep. Am. Sep. p. 208, pl. 56, f. 1—4 (3 larva 4 chrys.) *ocellata* Edw. Butt. N. A. II, pl. 2, *Apatura*, f. 1—4; *herse* Scud. Syst. Rev. Am. Butt. 9 (1872); ? *herse* Fabr. Ent. Syst. III, 1, p. 229.

Wing form much as in *celtis*. Primaries of male at base ferruginous, outwardly blackish brown. Two rows of yellow spots; one discal of seven, reaching across the wing; the other nearly submarginal of five. Secondaries blackish brown, with a row of six black spots with yellow iris. Female somewhat paler in color, with markings larger and yellow spots less pronounced. Beneath on primaries yellowish; secondaries gray with purple shade, ocelli replacing the black spots of upper surface; else beneath practically reproducing the markings of upper surface.

Expands 2—3 inches. *Hab.* East U. S.

The larva is in form and pattern of markings much like that of *celtis* but rather paler in color throughout: the processes surmounting the head are subglobular and spinose, of a yellowish color; the chrysalis has the head less distinctly bifid. Food plant *celtis* and *prunus* (Bd. Lec.)

Var. **proserpina**, Scudd. Pr. Bost. Soc. N. H. II, 401; Edw. Butt. N. A. II, *Apatura* pl. 2. f. 5 & 6.

Upper surface of secondaries black, markings not perceptible. Ocelli below almost obsolete.

Mr. Strecker in his catalogue records this as an aberration and records on "*abb* ♂ *nig* upper surface of all wings obscured with blackish".

Var. **flora**, Edw. Butt. N. A. II, pl. 5. 1, (var. *clyton*?) Can. Ent. 13. p. 85 (*sp. dist.*).

Wings more excised, secondaries ♂ more prolonged, color more ferruginous. Mr. Edwards first recorded this insect as a variety, possibly a species. In Can. Ent. *supra cit.* he records the fact that he has received the larva and that as it differs in habit and number of moults from *clyton* found in W. Va. he now considers it a distinct species. In view of the fact that the natural home of this *var.* is much to the South, and the development therefore naturally more rapid Mr. Edward's arguments lose force.

Expands 3 inches. *Hab.* Florida.

ACONISTHOS, Bd.

The single species of this genus which is only doubtfully catalogued as belonging to our fauna, is easily distinguished by its large size, falcate, tawny primaries, and fuscous hairy secondaries; apex of primaries black, with a single large white spot on costa near tip; outer margin also black, that color broadening toward the hind angle. Secondaries uni-

formly fuscous clothed with long olivaceous hair most dense near the inner margin. Beneath, the ground color is paler, irregularly striped and mottled with greenish and violaceous. Body short, very robust and hairy.

A. Orion, Fabr. Ent. Syst. III, 1, p. 55, (*Papilio*) Bd. Lec., Lep. Am. Sep. pl. 52, p. 195. (*Agonisthos*.)

Expands 4 inches. *Hab.* Fla. (?) Centr. & So. Am.

PAPHIA, *West.*

The species of this genus are easily known by the wing form, and by the stout rather short body. The primaries are falcate, with the apex acute, most distinctly so in the male. The secondaries are distinctly tailed at the middle of the outer margin, and the hind angle while not produced is distinctly rectangular. The palpi are very closely applied to the front, and a little exceed the vertex. The club of the antenna is gradual. The underside of the species most generally has a dead leaf color and appearance. Some confusion as to which species we have here has arisen but the following expresses the latest conclusions of authorities on the subject.

P. troglodyta, Fabr. Syst. Ent. p. 502 n. 250 (*Papilio*); *astinax* Cram. Pap. Ex. IV, t. 337, A. B. (*Papilio*); *glycerium* Riley (*nec. Doubl.*) Am. Ent. II, 121, f. 81-83, W. H. Edw. Butt. N. A. pl. 1 of *Paphia*; *andria* Scud. Buff. Bull. II, 248 (*Aenea*); *Morrisonia* Edw. Pap. vol. III, p.

Above coppery red, varying somewhat in intensity of color, extremity of discal cell black, outer margins darker, with a bluish tint at extreme edge, most distinct on secondaries; the female is larger than the male, the dark outer margin is much broader and there is a more or less complete transverse black line at outer third of both wings.

Expands 2.5—3.5 inches. *Hab.* So. and West States.

We have carefully examined specimens of *P. Morrisonia* determined by Mr. Edwards, and we cannot find any differences between them and the ordinary form which could be deemed specific or even varietal.

The larva feeds on wild sage (*Croton capitatum*), is of a bluish color when young, sprinkled with minute whitish papillæ, and larger reddish or brown tubercles. When full grown it measures 1.5 inches, tapers from the third segment toward each extremity; color except neck bluish green, papillæ pale; neck pale green, distinctly marked: head bilobed, a pair of orange papillæ on vertex. Chrysalis in form like that of *Danaïs*.

NEONYMPHA, *Westw.*

The species of this genus are sombre gray in color, darker only and with a rufous tinge in centre of wings in *rubricata* and *Henshawi*. Under surface always, upper surface usually, with ocellate spots, wings rounded; primaries with rounded apices and very convex costal margin, with costal vein greatly and suddenly inflated.

The genera in this group are obscurely characterized, and the species are most easily recognized by the ornamentation of the wings. The species may be tabulated as follows, and the relationship and order in which they should be catalogued is as in the table.

The larvæ are very similar in all the species of which they are known: they are elongate, thickest in the middle, longitudinally strigose, tail bifid. Chrysalis short, thick with the headcase rather incurved and obtuse. The food plants are various species of grasses.

Upper, surface of wings with ocellate spots near outer margin.

All wings two ocellate black spots on upper side. *eurytis*.

Each wing with but a single ocellate spot above *rubricata*.

Upper surface of wings without ocellate spots.

Beneath, primaries with four, secondaries with five elongate, irregular ocellate spots. *phocion*.

Beneath, primaries with a single spot near apex.

Secondaries with two larger and two very small spots. *soxybius*.

Beneath, secondaries with two gemminate spots at middle of outer margin.

Wings very pale grey. *gemma*.

Wings darker with a strong rufous tinge. *Henshawi*.

N. eurytis, F. Ent. Syst. 3, 157 (*Papilio cymela* Cram. Pap. Ex. Pl. 132, figs. C. and D, (*Papilio*). Harris 326, fig. 129, (*Hipparchia*). Bd. and Lec. Pl. 61, figs. 1—5, (all stages).

There are two narrow dark marginal lines above, on both wings; the spots are always ocellate but the anterior one on the secondaries is often indistinct; sometimes there is a small indistinct spot close to one or both the spots on secondaries. Beneath the color is paler, the spots on secondaries have the small spots close to the larger always present and one or two intermediate lead colored spots; two darker transverse lines on both pairs of wings.

Expands 1.5 inches. Larva on grasses. *Hab.* Atlantic States & Can.

N. rubricata, Edw. Trans. Am. Ent. Soc. 3, 212 (*Euptychia*).

Closely allied to the preceeding but evidently distinct by the darker color, the ferruginous central spaces on each wing, the lack of the spot at interior angle of primaries and anterior angles of secondaries above. Beneath the ground color is paler, the primaries have the central portion ferruginous and a submarginal transverse darker line; there are two silvered spots below the ocellate spot. Secondaries powdered with gray and *two* ocellate spots, the anterior near anterior angle; this is preceeded by a gemminate silvered spot and there are two similar spots between the ocellate spots; two darker transverse lines.

Expands 1.75—2 inches. *Hab.* Tex., Arizona.

N. phocion, Fabr. Sp. Ins. II. p. 138, (*Papilio*); *areolatus* Sm. Abb. I, pl. 13 and larva (*Papilio*); Bd. & Lec. Pl. 63, figs. 5—8 larva, pupa and imago.

Above immaculate of the usual gray color. Beneath paler with two ferruginous transverse lines. Between these lines is an elongated ferruginous circle, in which the primaries have three or four ocelli with a bluish pupil and a yellow iris; the secondaries enclose in this circle six ocelli which are oblong and have the pupil oval. Food plants *Andropogon nutans*, *Panicum sanguinale*.

Expands 1.5 inches. *Hab.* Atlantic States from N. Y. South.

A. sosybius, F. Ent. Syst. 3, 219 (*Papilio*); Bd. & Lec. pl. 63, figs. 1—4, (Imago, pupa and larva).

Upper surface immaculate; beneath paler with three obscure transverse undulated lines; the primaries have sometimes three additional indistinct spots below the ocellus and the secondaries sometimes have four similar spots between the ocelli.

Expands 1.5 inches. *Hab.* Middle & So. Sts., to Miss. Valley.

N. gemma, Hb. Zutr. 1, figs. 7 and 8, (*Satyrus*); Bd. & Lec. Lep. Am. Lep. pl. 62 (larva pupa & imago).

Above pale mouse gray secondaries with two or three gemminate black spots at middle of, and close to outer margin. Beneath more rufous mottled with irregular ferruginous lines; three more distinct transverse lines on primaries and two similar lines on secondaries; near to outer margin is a row of silvered spots; at the middle of outer margin is an oval violet patch in which are two gemminate black spots centred with silver.

Expands 1.5—1.75 inches. *Hab.* So. States.

N. Henshawi, Edw. Trans. Am. Ent. Soc. 5, 205.

This species is very like *gemma* in appearance and markings and indeed in our opinion it is but variety of the latter and entitled to rank only as such; however as we have seen only few specimens of *gemma* and those all pale forms and many *Henshawi* all of a dark color though by no means all agreeing with the type form in maculation or the extent of the red markings, we retain it for the present as a good species. It differs from *gemma* only in the darker ground color, the more or less extensive rufous tint in the wings and by the generally more distinct markings of underside.

Expands 1.5—2.5 inches. *Hab.* Arizona.

All our *Henshawi* are from Arizona, while we have no *gemma* thence the probability is that they are local variations somewhat as are *Satyrus*, *alope* and *nephele*, and that regions with intermediate forms will be found.

SATYRODES, *Scudder*.

Differs from *Neonympha* in that the veins of the primaries are scarcely perceptibly inflated and very gradually so. The difference in this respect from *Neonympha*, in which the species is placed by Mr. W. H. Edwards, is marked and Mr. Strecker in placing it in *Pararge* is equally incorrect. Mr. Scudder gives satisfactory reasons for his genus (*see Buff. Bull.* 2, 242). The species is:

S. canthus, Bd. Lep. Am. Sept. t. 60. (Larva, pupa and imago.) (*Satyrus*). *Boisduvalii*, Harr. Inj. Ins. 305, f. 128.

The subterminal space above is paler, else dull grey. The primaries have four, the secondaries six black spots on the upper side. They are small, on the primaries sometimes punctiform and scarcely ocellate. On the secondaries the spots are always larger and more distinct. Beneath the color is more yellowish, the spots are distinctly ocellate and centred with blue; a darker angulate line bounds the subterminal pale space; a similar line crosses the discal cell on the primaries, another terminates it; on the secondaries there is another from the costal nearly to the hind margin, $\frac{1}{3}$ from base.

Expands 1.75—2.25 inches. *Hab.* No. and M. States to Miss Larva on grasses.

A. Communication in reference to *Arctia Nais*.

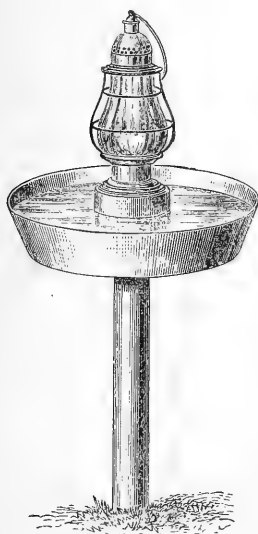
I am in receipt of a letter from Prof. Geo. H. French, calling my attention to the fact that I had misquoted him in my saying that he had proved the identity of *Arctia Nais* Dru., with *Arctia Phyllira* Dru., and *Arctia Phalerata* Harr. (Brookl. Bulletin. Vol. VI, p. 70).

The remark was not intended as quotation, but a statement from memory of what had been accomplished by Prof. French. But I see the statement is an incorrect one. One or two of my friends had for some time back been arguing the identity of *A. Nais* with *A. Phyllira*, but I could not agree with them though much was said in favor of the statement. That *A. Phalerata* is a variation of *A. Nais*, no one has doubted, and every one has proved that has raised the larvæ. Taking these two facts together, and never thinking that it could be that any one would write to prove the identity of *A. Nais* and *A. Phalerata*, I suppose I got the insects intended, interchanged in my mind; and in my statement brought in the name of the third. I am sorry to have made this error.

The synonymy given by me must be changed so that there are two species instead of one—the two being *A. Nais* Dru. and *A. Phyllira* Dru.

What final determination will be made I can not tell. Not the slightest reliance can be placed on color in the determination of species here, and I hesitate to say any reliance can be placed on the shape of wings. I have *A. Parthenice* Kirby (*Saundersii* Grt.) from the same brood with wings pointed in some and rounded in others on the outer margin. In the brood from *A. Excelsa* spoken of page 69, Vol. VI of Bulletin are in shape of wings differences as great as in *A. Nais* and *A. Phyllira*.

GEO. D. HULST.



Beetle trap.

We owe to the kindness of Mr. J. A. Lintner, State Entomologist, the adjoint woodcut which was printed in his excellent first annual report on the injurious and other insects of the State of New York (Albany Oct. 1883).

Mr. Lintner recommends its use to destroy noxious insects, but we think it would just as well answer to collect beetles placing it over night in the garden or the woods and looking next morning for the prey.

It consists of a pan filled with water, diluted alcohol or benzine, in the middle of which is placed on a smooth pedestal (fruit jar) a common bright burning lantern, its foot being smeared over with an attracting stuff molasses. The cost of such an arrangement would be so inconsiderable that several lanterns might be used.

F. G. SCHAUPP.

Remarks and Descriptions of new species.

There is such a variation in size, color and markings of the *Cicindelæ* that I feel rather diffident in venturing to describe a few species as new. I am fully aware that size, color and markings do not constitute a specific character, but when I consider that our greatest Entomologists have described three times as many as are recognized to day I wonder what specific characters they have made use of.

Say described his *scutellaris* with green head and thorax and reddish brassy elytra, then Dejean describes the green variety as *rugifrons*, the black as *modesta* and an immaculate green form as *unicolor*, and Halde-mann another as *Lecontei*, and to day everybody agrees that there is no specific difference between them except in color. It is not necessary to cite more of the numerous instances of this kind, the aspect of our varieties and synonyms show plainly enough the truth of my assertion. The number of our species becomes gradually reduced and that of the varieties increased and I have no doubt there are some more species which may in time be degraded as varieties, e. g. *Willistoni* Lec. a variety of *fulgida* Say, *Hentzii* Dej. a variety of *rufiventris* Dej.; *striga* Lec. a variety of *severa* Laf., especially when we consider that *limbata* Say and *hyperborea* Lec. are the same species and that *decemnotata* Say is but a variety of *per-purea*; I would say the same thing about *cuprascens*, *puritana* and *macra*, if Dr. Horn had not clearly proved that they invariably differ by the shape of the elytral apex from each other.

Two of my new species show rather a tendency to unite two species being intermediate forms.

Omus ambiguus, n. sp. This species resembles *Lecontei* Horn and *Audouinii* Reiche; it belongs to my second group, the lateral margin of the thorax attaining the basal margin; from *Lecontei* Horn it differs by the shape of the elytra, agreeing therein with that of *Audouinii*, by the bisinuate labrum, by the much deeper frontal impressions, by the smoother thorax, with hind angles more prominent, by the elytra more irregularly confusedly punctured, and smoother near the middle; from a large specimen of *Audouinii* Reiche it differs by lateral margin of the thorax united to the basal, by much smoother and less confluent punctured elytra and by markedly stouter antennæ.

One male from Mt. Shasta District, Cal., received from Mr. Hy. Edwards.



Cic. latesignata Lec. var. *tenuicincta* Schaupp. A ♀ specimen from Mr. H. Edwards is highly interesting as connecting to a certain extent *latesignata* Lec., *generosa* Dej., and *vulgaris* Say. The specimen in question comes from Colorado and agrees with *latesignata* Lec. in the shape of head, thorax and elytra, with *vulgaris* Say in the exact form and direction of the humeral lunule and middle band, with *generosa* Dej., in the shape of the broad apical lunule and in having the markings connected at the margin in precisely the same form as the typical *generosa*, although the connecting line is much narrower. The specimen is peculiar and might have been with nearly the same propriety placed as a variety of either of the above three species, but the general form of the insect is most nearly like *latesignata* Lec., and I have therefore referred it as a variety of that species. The markings are much indented as shown in the adjoining figure.



Cic. lunalonga n. spec. Color above blackish bronze, beneath, head and thorax brilliant green, abdomen metallic blue, slightly hairy on the sternum. Head glabrous, granulate, striate between the eyes; labial palpi pale with last joint dark; labrum short with a distinct tooth at middle; thorax glabrous nearly quadrate, granulate very slightly narrowed behind, impressions very deep, greenish bronze; elytra subparallel, granulate, finely punctured with a row of green foveæ near the suture and several scattered foveæ near the humeri; tip of elytra separately rounded, short sutural spine. The markings consist of a slender, very long humeral lunule running obliquely to the middle of the elytra reaching nearly the suture, dilated at tip; middle band not reaching the margin, arising from a triangular spot, bent rectangularly at middle, descending somewhat obliquely and hooked at tip; the transverse portion is heavy but the descending line short and slender; apical lunule broad, broadly indented anteriorly and less to posteriorly. Legs green bronze, stout, moderately long.

Occurs in Sierra Nevada, Cal. One ♀ kindly given me by Mr. H. Edwards Length 9.5 mm.

This species belongs to the second division, group four, and is allied to *cinctipennis*, from which it differs by having the labrum one toothed and the markings quite different.

I have received from Mr. A. S. Fuller a fine variation of *obsoleta* Say, black with six small round dots, a humeral, a submarginal at middle and an apical, he also gave me two beautiful variations of *splendida*, one entirely black, the other entirely green. All these specimens are from N. Mex.

Mr. W. Dokhtoureff describes in his *Revue mensuelle d'Entomologie* 1883, vol. I, No. 1, p. 12, a new spec. *Cic. bisignata* from California, North or South? He described it as opaque greenish black above and dark green brilliant beneath; head finely punctured, dark green; labrum short, transverse, (not mentioning any thing about dentation), thorax nearly quadrate, the longitudinal impression scarcely visible, the transversal ones distinct. Elytra nearly cylindrical, very finely punctured, dark olivaceous; the markings are a slender yellowish middle band beginning at the middle of the elytra and descending very obliquely towards near the suture, hooked at tip; the suture, the lateral margin and the scutellum are brilliant black; the labial palpi are pale with black tip. Tibiæ and tarsi brown, femora blackish, scarcely ciliate; the abdominal segments are light brown. Length 7 mm. If not a Mexican species (from the Peninsula of California,) it may be a variation of our very variable *cinctipennis* Lec. var. *imperfecta* Lec., with which the description agrees in nearly all respects.

The larva of *Cicindela repanda* Dej. (f. 124) is yellowish white, head piceous, thorax slightly bronzed, resembles very much that of *Tetracha*, it has eight eyes, the lower of the smaller pair is very indistinct, the antennæ are as in *Tetracha*; the maxillary palpi have the joints gradually longer and more slender from the first to the third; fifth abdominal segment with the gibbosity emarginate behind, each side with a long slender hook, and a short acute tubercule the latter directed posteriorly. (Horn. Am. Ent. Soc. VII, p. 34—37.)

The pupa figured in Bull. Brooklyn Entom. Soc. vol. V, p. 18, bears some resemblance to other Carabidous pupæ notably to that of a *Carabus*, but is quite distinct by processes on the first five segments of the upper surface near the margin, those of the fifth being the longest.

Mr. Louis Schledorn, a very skillful young man under my direction engraved the plates and did excellent work, but unfortunately ill health compelled him to leave the city for Colorado and the completion and coloration had to be intrusted to a much inferior workman and that is the reason why we present on plate V, drawn by Mr. J. B. Smith, the figures of some elytra not very distinctly represented on the colored plates together with some noteworthy variations, also the larvæ of the four genera.

With our next number will be issued plate V, together with explanation and index of species.

Amblychila Say.

- 1 cylindriciformis Say.
Piccolomini Reiche.

Omus Esch.

- 2 Dejeani Reiche.
 3 Edwardsii Crotch.
 4 Audouini Reiche.
 5 submetallicus Horn.
 6 Hornii Lec.
 7 californicus Esch.
 8 sequoiarum Crotch.
 9 ambiguus Schaupp.
 10 Lecontei Horn.
 11 laevis Horn.

Tetracha Hope.

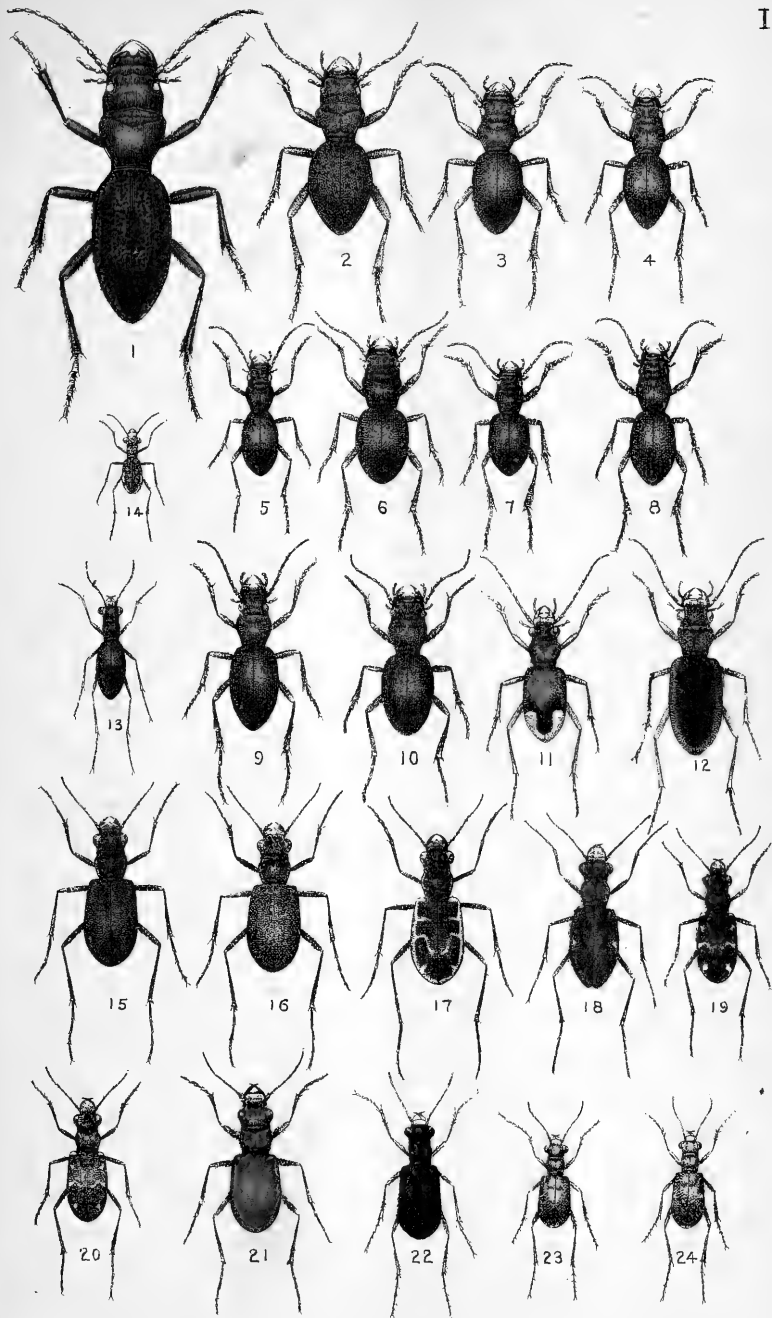
- 12 carolina Lin.
 13 virginica Lin.
virginata Lin.

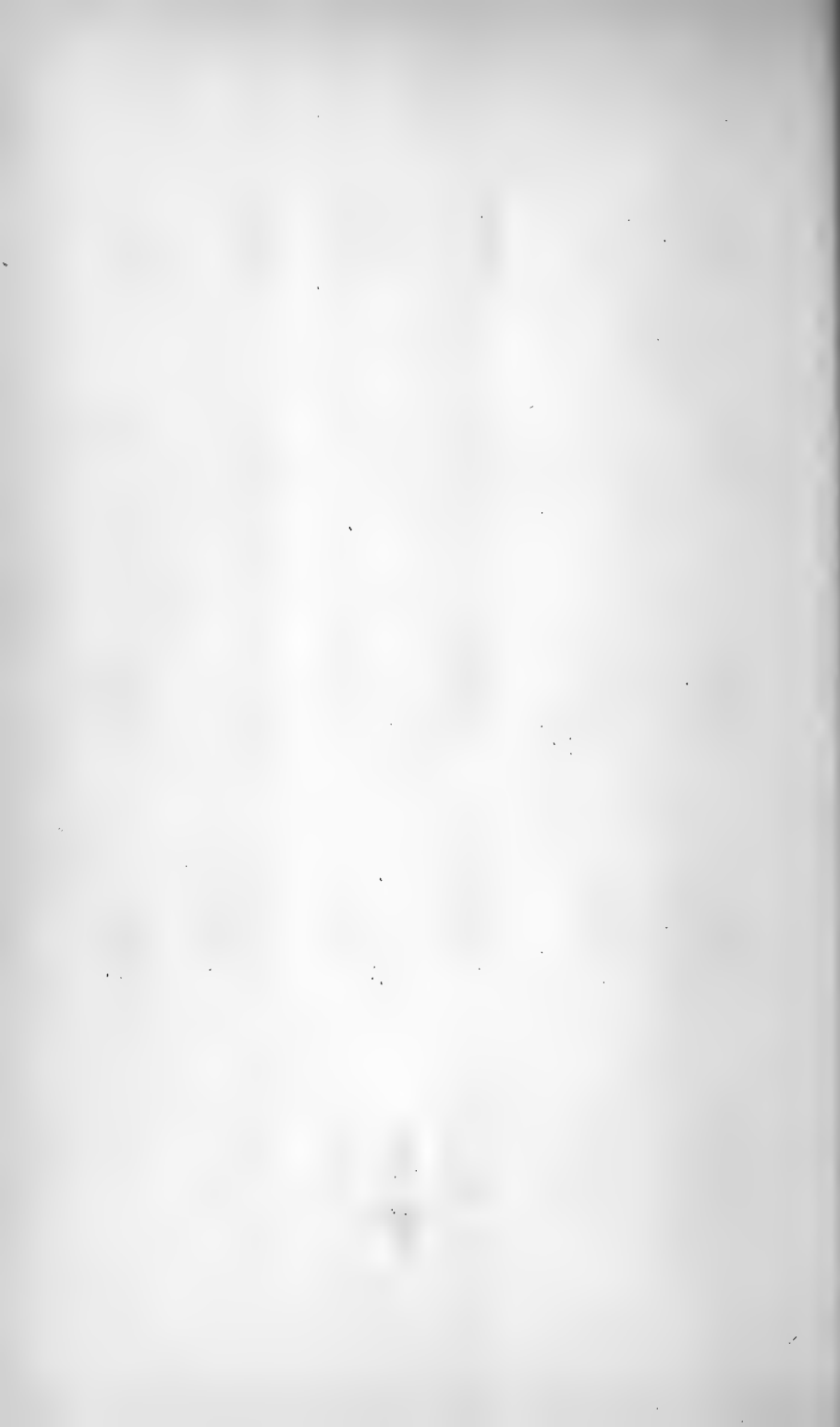
Cicindela Lin.

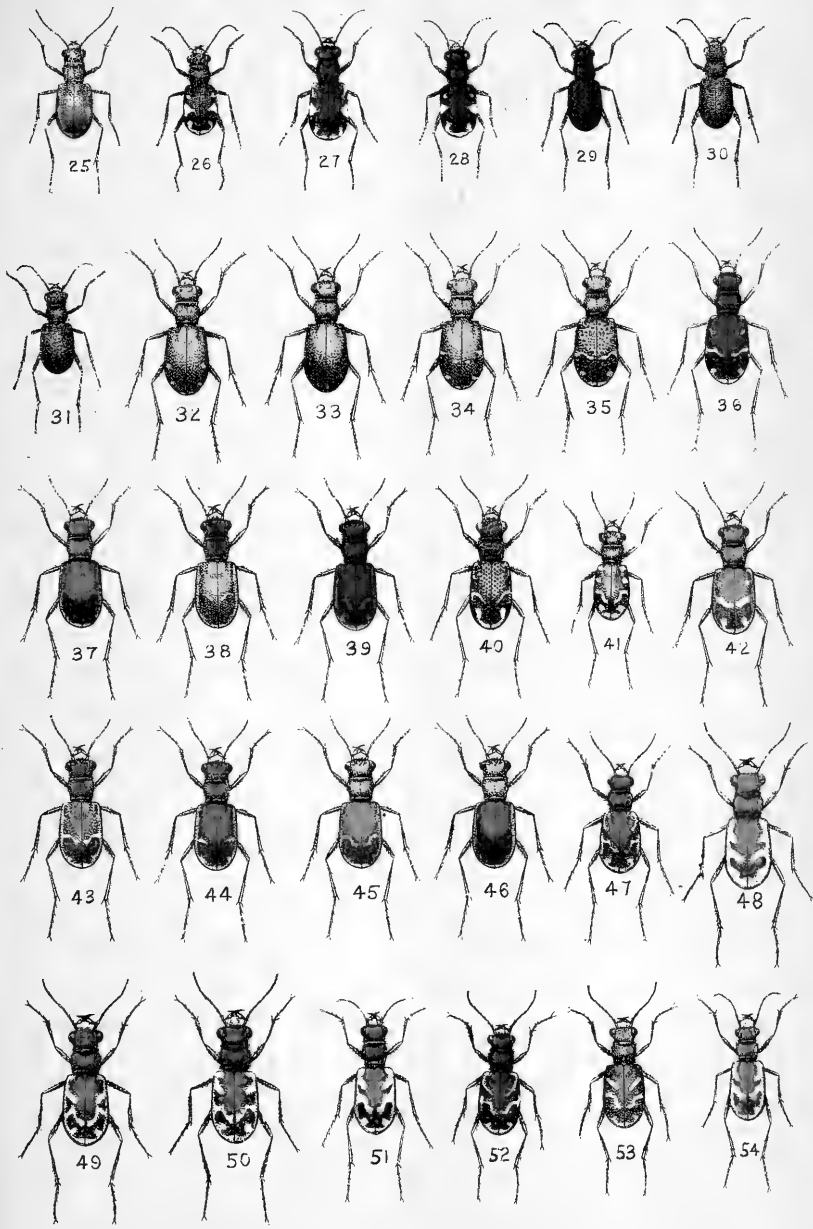
- 14 Pilatei Guerin.
maga Lec.
a Belfragei Sallé.
 15 celeripes Lec.
cursitans Lec.
 16 obsoleta Say.
a vulturina Lec.
b prasina Lec.
 17 unipunctata Fab.
 18 longilabris Say.
a montana Lec.
b perviridis Schaupp.
c Laurentii Schaupp.
 19 scutellaris Say.
a rugifrons Dej.
denticulata Hentz.
b modesta Dej.
obscura Say.
c Lecontei Hald.
d unicolor Dej.
e nigrior Schaupp.
 20 nigrocoerulea Lec.
 21 pulchra Say.
 22 Hornii Schaupp
anthracina || Horn.
 23 pimeriana Lec.
viatica Lec.
 24 sexguttata Fab.
a violacea Fab.
b patruela Dej.
c consensanea Dej.

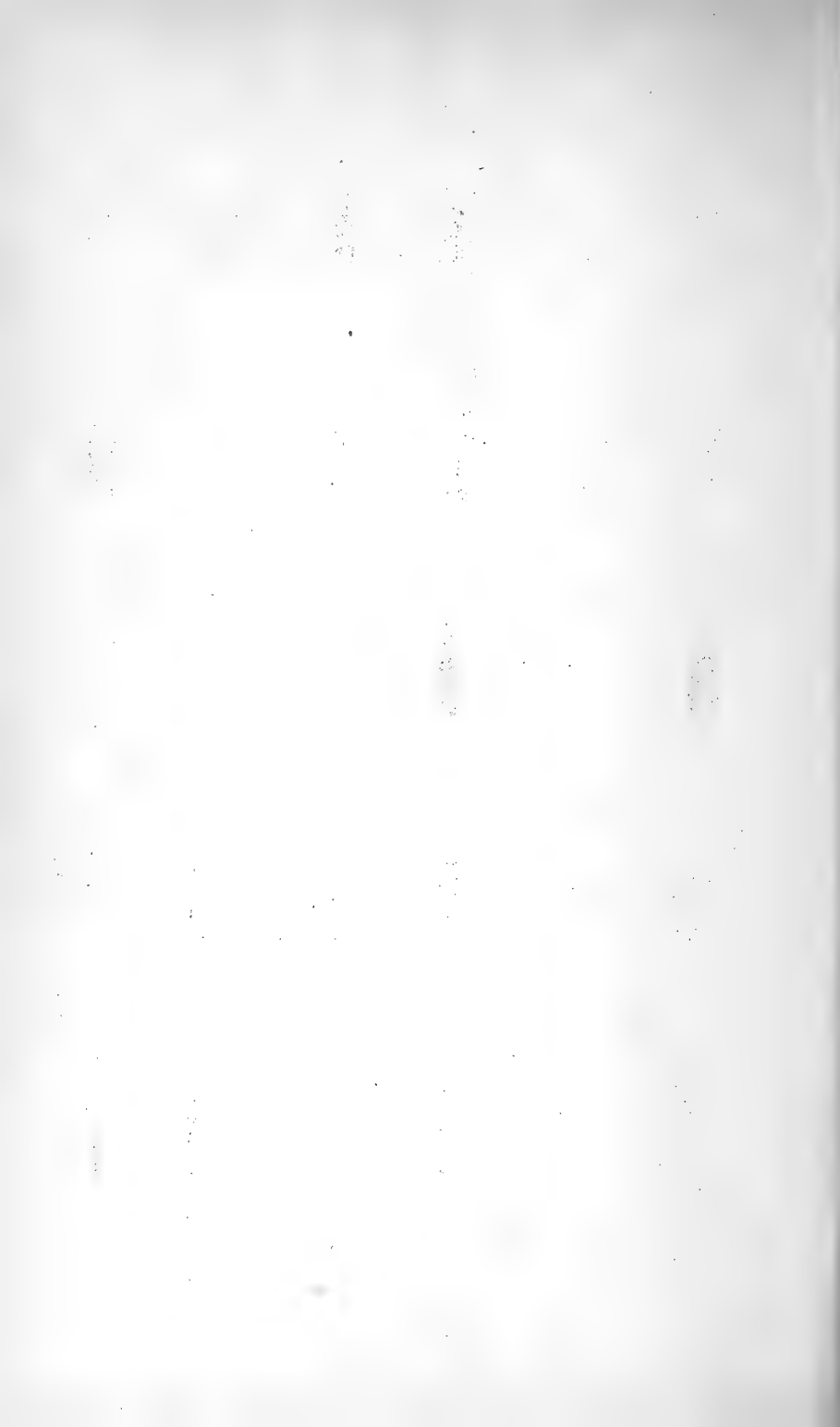
- 25 purpurea Oliv.
a Audubonii Lec.
b graminea Schaupp.
c cimarrona Lec.
d decemnotata Say.
e limbalis Lec.
f limbalis Klug.
g spreata Lec.
h amocna Lec.
i splendida Hentz.
sexguttata var. Feb.
marginatis var. Dej.
 17 formosa Say.
a generosa Dej.
b venusta Lec.
 27 latesignata Lec.
a tenuicincta Schaupp
 28 Willistoni Lec.
 29 fulgida Say.
 30 senilis Horn.
 31 hyperborea Lec.
a limbata Say.
limbigera G. & H. Cat.
 32 ancocisconensis Harr.
 33 vulgaris Say.
a vibex Horn.
b obliquata || Kirby.
obliquata Dej.
transquebarica Herbst?
 34 repanda Dej.
a oregona Lec.
b guttifera Lec.
c 12 guttata Dej.
baltimorensis Lec.
proteus Kirby.
hirticollis Say.
 35 pusilla Say.
a terricola Say.
b cyanella Lec.
 36 hirticollis Dej.
albohirta Dej.
gravida Lec.
unita Kollar,
ponderosa Thoms. Mex.
 37 cinctipennis Lec.
a imperfecta Lec.
bisignata Doukt?
 38 lunalonga Schaupp.
 39 rectilatera Chaud.
texana Lec.
 40 tenuisignata Lec.
 41 punctulata Oliv.
a micans Fab.

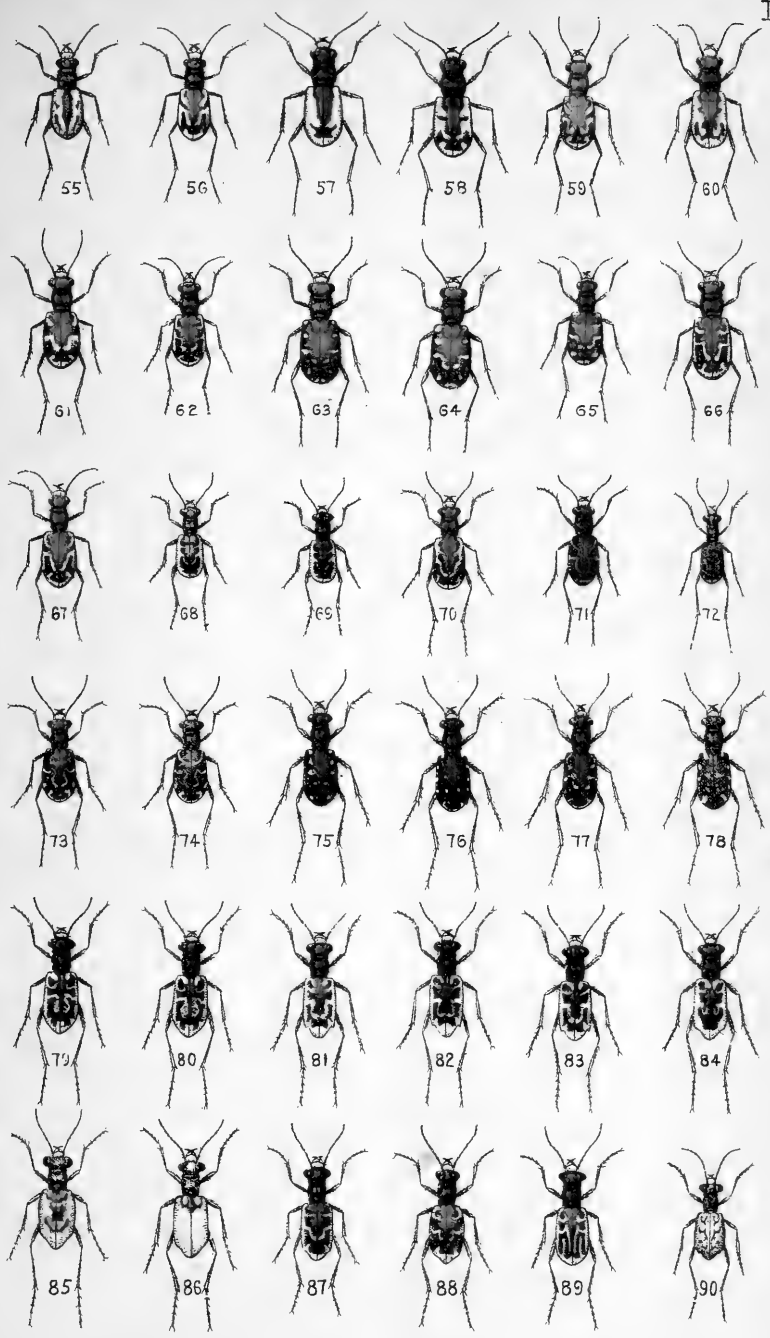
- 42 tortuosa Dej.
serpens Lec.
ascendens Lec.
sigmoidea Lec.
trifasciata Klug.
 43 dorsalis Say.
a media Lec.
b Saulcyi Guerin.
signata Dej.
 44 hamata Brulle.
lacerata Chaud.
 45 marginata Fab.
variegata Dej.
 46 cuprascens Lec.
blanda var. Lec.
 47 puritana Horn.
 48 macra Lec.
blanda † Lec.
 49 Wapleri Lec.
 50 blanda Dej.
tarsalis Lec.
 51 nevadica Lec.
 52 sperata Lec.
 53 Gabbii Horn.
 54 hirtilabris Lec.
 55 gratiosa Guerin.
 56 lepida Dej.
 57 viridisticta Bates.
 58 lemniscata Lec.
 59 circumpecta Laf.
a praetextata Lec.
californica Men.
Johnsoni Fitch
 60 togata Laf.
 61 pamphila Lec.
 62 severa Laf.
 63 striga Lec.
 64 hæmorrhagica Lec.
a pacifica Schaupp.
 65 rufiventris Dej.
a cumatilis Lec.
b 16 punctata Klug.
 66 Hentzii Dej.
haemorrhoidalis || Hentz
 67 marginipennis Dej.
 68 Schauppil Horn.
 69 abdominalis Fab.
a scabrosa Schaupp.
 70 politula Lec.
 71 Sommeri Mann.
ferrugata Putz.

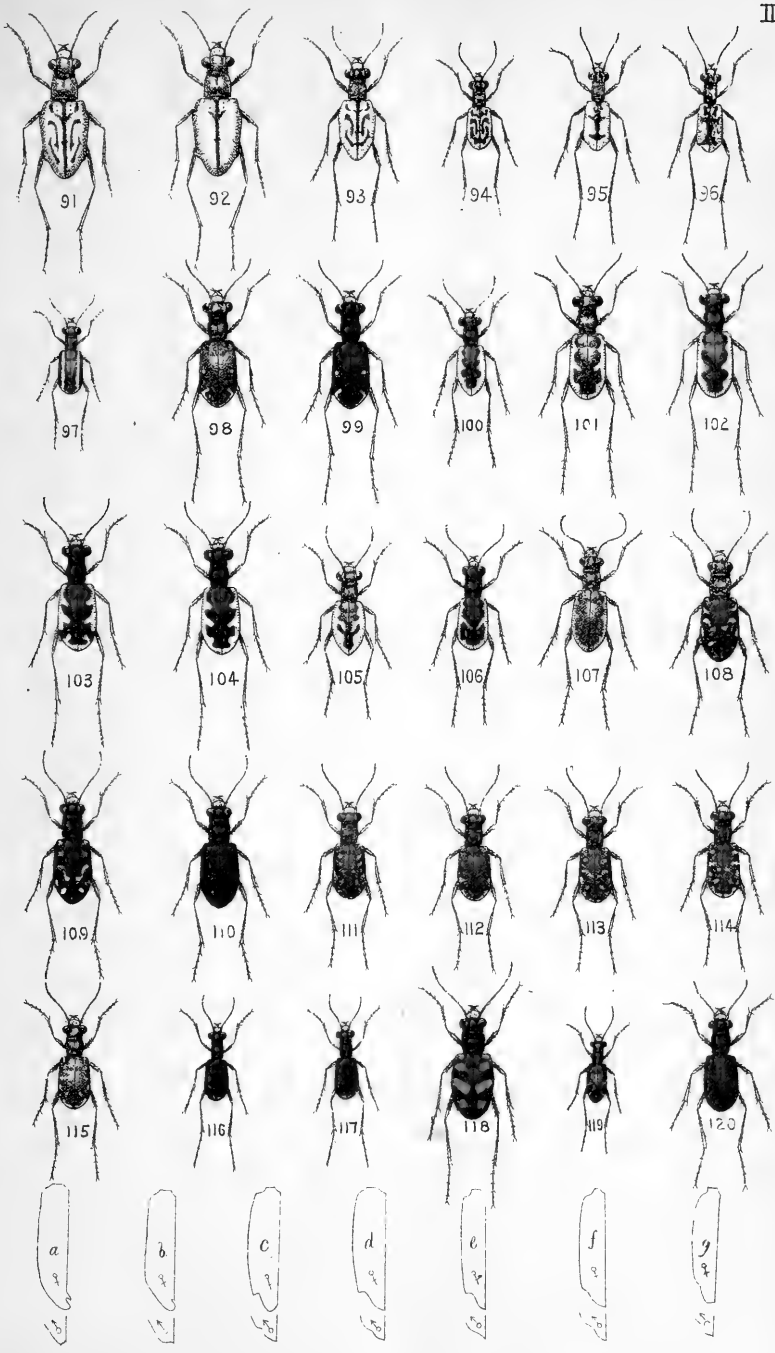


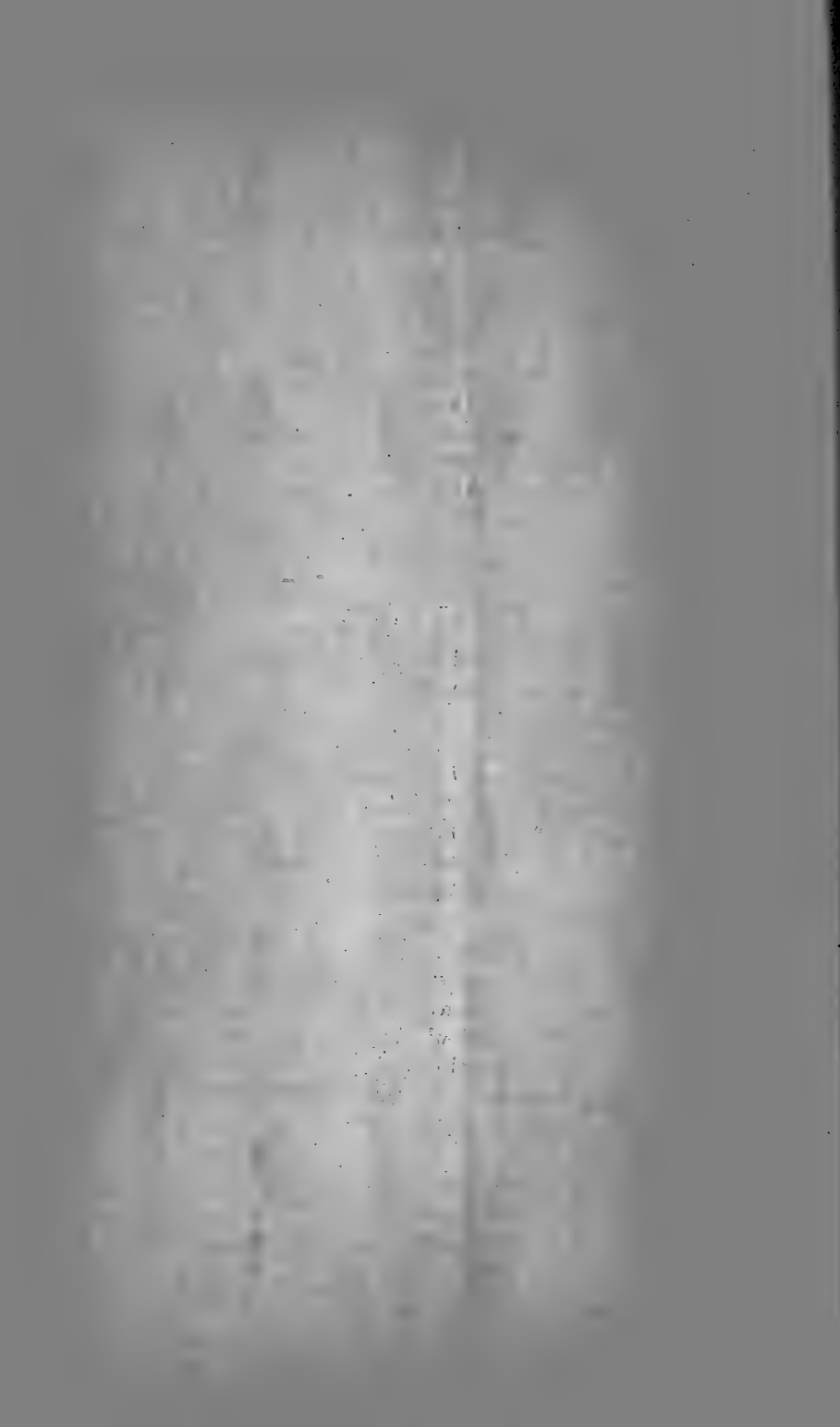














125



126



127



128



129



a,



b,



130



131



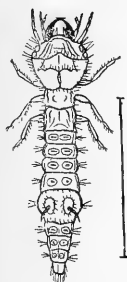
132



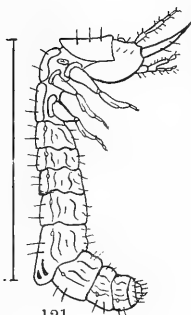
133



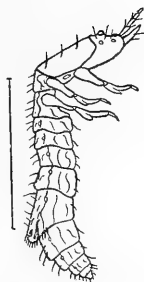
134



123



121



122



124



135



136



137



a,



138



139



140



141



142



143



144



145

50
Del.



EXPLANATION OF THE PLATES.

Amblychila.

1 cylindriciformis *Say*.

Omus.

- 2 Dejeanii *Reiche*.
- 3 Edwardsii *Crotch*.
- 4 Audouini *Reiche*.
- 5 submetallicus *Horn*.
- 6 Hornii *Lec*.
- 7 californicus *Esch*.
- 8 sequoiarum *Crotch*.
- 9 Lecontei *Horn*.
- 10 lævis *Horn*.

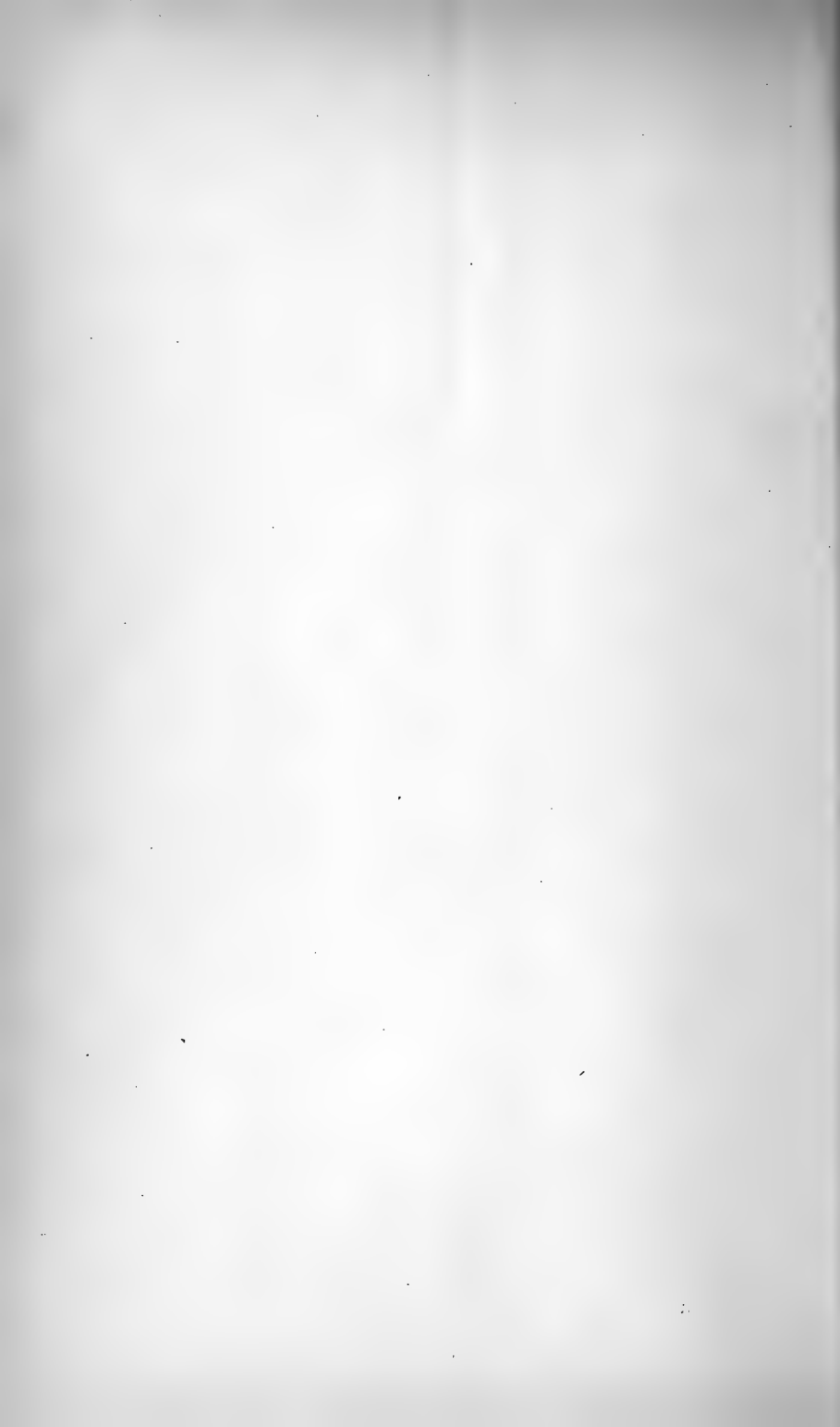
Tetracha.

- 11 carolina *Linn*.
- 12 virginica *Linn*.

Cicindela.

- 13 Pilatei *Guerin*.
- 14 cursitans *Lec*.
- 15 obsoleta *Say*.
- 16 prasina *Lec*.
- 17 vulturina *Lec*.
- 18 unipunctata *Fab*.
- 19 longilabris *Say*.
- 20 perviridis *Schpp*.
- 21 pulchra *Say*.
- 22 Hornii *Schpp*.
- 23 nigriocœrulea *Lec*.
- 24 pimeriana *Lec*.
- 25 scutellaris *Say*.
- 26 rugifrons *Dej*.
- 27 Lecontei *Hald*.
- 28 modesta *Dej*.
- 27 nigrior *Schpp*.
- 30 unicolor *Dej*.
- 31 " var.
- 32 sexguttata *Fab*.
- 33 violacea *Fab*.
- 34 " var.
- 35 patruela *Dej*.
- 36 consentanea *Dej*.
- 37 purpurea *Oliv*.
- 38 graminea *Schpp*.
- 39 Audubonii *Lec*.
- 40 cimarrona *Lec*.
- 41 decemnotata *Say*.
- 42 limbalis *Klug*.
- 43 " var.
- 44 " var.
- 45 splendida *Hentz*.
- 46 " var.

- 47 ancocisconensis *Harr*
 - 48 formosa *Say*.
 - 49 generosa *Dej*.
 - 50 " var.
 - 51 venusta *Lec*.
 - 52 vulgaris *Say*.
 - 53 vibex *Horn*.
 - 54 var. of 51.
 - 55 limbata *Say*.
 - 56 hyperborea *Lec*.
 - 57 latesignata *Lec*.
 - 58 " var.
 - 59 fulgida *Say*.
 - 60 Willistoni *Lec*.
 - 61 senilis *Horn*.
 - 62 repanda *Dej*.
 - 63 duodecimguttata *Dj*.
 - 64 oregona *Lec*.
 - 65 guttifera *Lec*.
 - 66 hirticollis *Say*.
 - 67 tenuisignata *Lec*.
 - 68 cinctipennis *Lec*.
 - 69 " var.
 - 70 imperfecta *Lec*.
 - 71 pusilla *Say*.
 - 72 cyanella *Lec*.
 - 73 tortuosa *Dej*.
 - 74 " var.
 - 75 rectilatera *Chaud*.
 - 76 punctulata *Oliv*.
 - 77 " var.
 - 78 micans *Fab*.
 - 79 hamata *Brulle*.
 - 80 marginata *Fab*.
 - 81 cuprascens *Lec*.
 - 82 puritana *Horn*.
 - 83 macra *Lec*.
 - 84 Wapleri *Lec*.
 - 85 Mexican species.
 - 86 " "
 - 87 sperata *Lec*.
 - 88 nevadica *Lec*.
 - 89 Gabbii *Horn*.
 - 90 lepida *Dej*.
 - 91 dorsalis *Say*.
 - 92 " var.
 - 93 media *Lec*.
 - 94 Saulcyi *Guerin*.
 - 95 gratiosa *Guerin*.
 - 96 hirtilabris *Lec*.
 - 97 lemniscata *Lec*.
 - 98 severa *Laf*.
 - 99 " var.
 - 100 togata *Laf*.
 - 101 circumpecta *Laf*.
 - 102 " var.
 - 103 californica *Menet*.
 - 104 prætextata *Lec*.
 - 105 pamphila *Chaud*.
 - 106 Schauppil *Horn*.
 - 107 marginipennis *Dej*.
 - 108 hæmorrhagica *Lec*.
 - 109 var. from Utah.
 - 110 pacifica *Schpp*.
 - 111 16 punctata *Klug*.
 - 112 rufiventris *Dej*.
 - 113 " var.
 - 114 Hentzii *Dej*.
 - 115 cumatilis *Lec*.
 - 116 abdominalis *Fab*.
 - 117 scabrosa *Schpp*.
 - 118 Sommeri *Mann*.
 - 119 viridisticta *Bates*.
 - 120 politula *Lec*.
- (pl. IV.)
- a elytra of hamata.
 - b " " marginata.
 - c " " cuprascens
 - d " " puritana
 - e " " macra.
 - f " " blanda.
 - g " " hirtilabris.
- (pl. V.)
- 121 Larva of Amblychila
 - 122 " " Omus.
 - 123 " " Tetracha.
 - 124 " " Cicindela.
 - 125 C. vulturina *Lec*, var.
 - 126 " montana *Lec*, "
 - 127 " Lecontei *Hld*, "
 - 128 " obliquata *Kirby*.
 - 129 a. b. hyperborea *Lec*.
 - 130 ancocisconensis *Har*.
 - 131 " vulgaris *Say*.
 - 132 " repanda *Dej*.
 - 133 " oregona *Lec*.
 - 134 " guttifera *Lec*.
 - 135 " 12 guttata *Dej*.
 - 136 " pusilla *Say*.
 - 137 and a, hirticollis *Say*.
 - 138 " cinctipennis *Lec*.
 - 139-41 imperfecta *Lec*, v.
 - 142 tenuisignata *Lec*.
 - 143 tortuosa *Dej*, var.
 - 144 Schauppil *Horn* var.
 - 145 10 notata *Say*.



Synopsis of the N. A. species of *Satyrus* West.
with notes on the species
collected by the N. Transcontinental Survey.

By JOHN B. SMITH.

Among the Butterflies collected by the members of the Entomological section of the N. Transcontinental Survey in 1882 were a large number of specimens, belonging to the genus *Satyrus* West., which Dr. Hagen kindly delivered to me for study and arrangement. The dates on which the species were captured, and the localities are as follows: Umatilla Or. June 25 (level), Camp Umatilla W. T. June 26 & 27 (level), Yakima R., W. T. Lone Tree, June 30, Morgans Ferry, July 1, (gradually rising to), Yakima City W. T., July 2, 3 & 4 (1500 ft.), "Nelsons" W. T. July 4 & 5 (2000 ft.), Wenass V., W. T., July 6 & 7 (2000 ft.), Yakima R., July 8 & 9, Klikitat V., W. T., July 10, 11 & 12 (3000 ft.), Ellensburg, W. T., July 14 (1000 ft.), Yakima R., W. T., July 16, 17, 18 and 19 (1000 ft.), Ainsworth, W. T., July 20 (500 ft.), Spokane, W. T. July 21 & 22 (1490 ft.), Colville V., W. T., Loon Lake, July 23, and Browns July 24 (2500 ft. to), Little Spokane, July 26, and Spokane, July 27 (1490 ft.), Weeksville Mont, Aug. 2 (2000 to 3000 ft.).

The species collected were: June 25, *S. paulus*, *S. sylvestris*, *S. incana*, June 30, *S. paulus*, July 2, 3 & 4, *S. boopis*, July 4 & 5, *S. ariane*, July 8 & 9, *S. charon*, July 10, 11 & 12, *S. sylvestris*, *S. charon*, *S. paulus*, July 14, *S. boopis*, July 16—19, *S. paulus*, July 21 & 22, *S. ariane*, *S. boopis*, July 23, *S. charon*, *S. phocus*, July 24, *S. ariane*, July 26 & 27, *S. sylvestris*, Aug. 2, *S. ariane* and *S. charon*.

In another form the captures were as follows: *S. boopis*, July 4, 5, 14, 21 & 22 (elev. 1000—2000 ft.), *S. ariane*, July 2, 3, 4, 5, 21, 22, 24. Aug. 2 (elev. 1400—3000 ft.), *S. incana*, June 25 (level), *S. paulus*, June 25 & 30, July 11, 12, 13, 16—to 19 (level to 3000 ft.), *S. charon*, July 8—12, 23, and Aug. 2 (elev. 2—3000 ft.), *S. phocus*, with *charon*, *S. sylvestris* June 25, July 10—12, 26 & 27 (level to 3000 ft.).

Quite a large number of each species were taken and from the whole number of nearly 150 examples I selected 60, scarcely two of which were entirely alike, and they form the basis of the following synopsis; specimens of each species being also obtained from the Brooklyn collections, many determined by Mr. W. H. Edwards, while in Mr. H. Edwards collection I saw typical specimens of the California forms. The names

attached to the species were verified and the W. T. material was classified by the aid of Mr. Edwards excellent paper in Vol. 12 of the Can. Ent. Mr. Edwards in the preparation of that paper evidently had before him a large mass of material, but apparently none covering the localities above mentioned, and my conclusions from the material before me are somewhat different from those reached by him.

The genus *Satyrus* is distinguished by having all the veins of primaries inflated at base: the costal very prominently so, the median more gradually, the inflation traceable to the inception of vein two, vein one very gradually and much less distinctly than either of the others. The species vary in expanse from 1—2.5 inches, are of a smoky brown color above and in the first group usually with a more or less distinct yellow band near outer margin, in which are from one to three ocellate spots. When there is no distinct band, the spots still remain, are often not ocellate and occasionally one is wanting. In group two the species lack the distinct band. In *sthenele* it is faintly indicated in the ♀, while in all the species the ♀ has a more or less distinct yellowish ring surrounding the spots, which is usually obsolete or entirely wanting in the ♂. The secondaries in all but two of the species have none, or but a single ocellate spot on upper surface. Beneath, the ocelli and band of primaries are reproduced, the former usually much more distinctly than above. The secondaries are mottled with short dark lines, have usually a more or less distinctly marked discal band, the borders of which are formed of rather darker and often extremely irregular lines: beyond the outer of these boundary lines the wing is usually paler, and in this paler space are from one to six spots usually ocellate, and when all present, in two groups of three each, the middle spot of each group largest.

In tabular form the species which I recognize as such may be distinguished as follows:

- | | |
|---|--------------------------|
| Size large, primaries broad, comparatively short, apex and outer margin rounded..... | <i>Group alope.</i> |
| Size smaller, primaries (of ♂ especially) proportionately longer, apex acute or rectangular. outer margin oblique or subsinuate not rounded | <i>Group sylvestris.</i> |

Group **ALOPE.**

Primaries above with a distinct yellow band near outer margin, in which are from 1—3 ocellate spots.

Upper ocellus of primary double, one or both of the two larger spots on under-side of secondaries lenticular..... **Wheeleri.**

Upper ocellus of primary single, all the spots beneath, rounded.....(type) **alope**.
 Primaries without the distinct yellow band, ocellate spots often reduced in
 size to mere dots without centre; else as in the preceeding.....

(variety) **nephele**.

Group **SILVESTRIS**.

Inner margin of discal band of secondaries but slightly angulate or crenate,
 not strongly dentate.

Primaries above and beneath with distinct rufous tinge on disc.....**Meadii**.

Primaries without rufous tinge.

Outer margin of discal band of secondaries not strongly dentate on cell...**sthenele**.

Outer margin of discal band of secondaries deeply dentate on cell.....**Baroni**.

Inner margin of discal band of secondaries very strongly and distinctly dentate
 and angulate **Silvestris**.

S. Wheeleri, Edw. Tr. Am. Ent. Soc. IV, 343, Mead, Wheeler's Rep. V, 773, pl. 39. *Hoffmani*, Streck. Lep. Rhop.-Het. p. 31, pl. 4 ♀, p. 66, pl. 8 ♂.

This species is easily known by the unusually pale color, the twin upper spot on primaries, the spots on upper surface of secondaries, which are usually three, the lenticular and spots on secondaries beneath. Mr. Edwards states that both of the larger spots on secondaries beneath are lenticulate, but in one specimen I have seen, the lower one was distinctly round while the upper was elongate oval; in other respects the specimen agreed with the typical form. The number of ocelli on upper surface of secondaries varies from one to three, three being the more usual number. Mr. Strecker considers this an aberration of *alope*, but while it is undoubtedly an offspring from the same stock and is closely related to it, I think we are hardly justified in classing it as an aberration in view of the agreement between all the specimens heretofore discovered and the want of really intermediate forms. The colors on Mr. Strecker's plates are too dark for this species.

Hab. Calif., Ariz., Nev., Col.

S. alope, Fabr. Ent. Syst. III, 1, p. 229 (*Papilio*); Bd. Lec. Lep. Am. Sep. pl. 59, larva, pupa and imago of *pegale*.

A. maritima Edw., Can. Ent. 12, 23; v. *Texana* Edw., Can. Ent. 12, 24; form **pegale** Fabr. Syst. Ent. 494 (*Papilio*); form **nephele** Kirby, Faun. Bor. Am. IV, 297 (*Hipparchia*); *incana* Edw. C. E. 12, 91; v. *olympus* Edw. Can. Ent. 12, 31; v. *boopis* Behr. Pr. Cal. Ac. Nat. Sc. III, 164; v. *ariane* Bd. Ann. Soc. Ent. Fr. 2 new ser. X, 307; v. *Gabbii* Edw., Trans. Am. Ent. Soc. III, 193 (*Hipparchia*).

This is the most variable of all our species and in times gone by, its variations have led to differences of opinion among entomologists, and may lead to more. In Mr. Edward's article "On certain species of *Satyrus*" in Vol. 12 of the Canadian Entomologist he gives the synonymy

of this insect as follows: 1 dimorphic from **alope** var. *Texana* and *maritima*; 2 dimorphic from **pegale** var. *incana*; sub species, 1 *olympus*, 2 *boopis*. *Pegale*, *ariane* and *Gabbii* are considered as good species, and reasons for the conclusion are given: my reasons for holding a contrary opinion will be given in describing the varieties.

The typical *alope* expands nearly two inches, is of a smoky brown color, with a clear yellow band near the outer margin, broadest in the ♀, and in which are contained two large black spots centred with white, the latter color surrounded by a few blue scales. They vary in size, and are not always equal: occasionally there is a distinct 3d ocellus, and more commonly an additional black dot; rarely one of the ocelli, (the lower) disappears entirely, or is indicated by a black spot. The secondaries have usually a small ocellus near anal angle, often one or two small spots in addition thereto, while in many instances the wing is entirely immaculate. Beneath, the primaries reproduce the yellow band and ocelli; the secondaries have near the outer margin from 0 to 6 ocelli, the number most often complete in the ♂ and the spots most often entirely wanting in the ♀. Of this typical form, Mr. Edwards has described var. *maritima*, which is somewhat smaller, ground color darker, more blackish, and the yellow of the band more reddish. This variety and all the intergrades with *nephele* he took at Martha's Vineyard. The same variety has been taken on Long Island, and I took several specimens the past summer in the pine barrens of southern New Jersey which however fully equalled in size the ordinary run of *alope*.

Var. *Texana* Edw. is of a paler brown, the band more ochrey, the anal ocellus complete and always present, the ocelli beneath always six in number, larger than in the type form, centred with white, and surrounded by an ochrey ring. This is the extreme southern form, and the transition from the darker northern specimens is gradual.

Form **pegale** Fabr. It is difficult to place this insect either as a species or as a variety. A variety as that term is ordinarily used is not—yet there are intermediate forms which connect it with the true *alope*. That it breeds true to itself in certain localities is certain, that it varies, and in some places produces forms not to be distinguished from *alope* I hope to prove. The southern and type form of *pegale* expands nearly 2.5 inches is of a more reddish and with but a single ocellus (the upper.) The secondaries have a complete anal ocellus surrounded by yellow and beneath are six similar ocelli. The second ocellus of primaries is however very

often present either perfect, or as a more or less distinct black dot. In 1880, Mr. Edwards knew of only solitary examples taken north of Virginia, along the Atlantic coast. In 1882 however, Mr. E. M. Aaron of Phila. and Mr. S. F. Aaron, his brother, collected the species in large numbers in So. N. J., and the past summer (1883) I collected specimens in the pine barrens of the same State; in small numbers it is true, and all with two ocelli, and of a somewhat smaller size (2 inches) than the southern specimens; but except for the difference in size, there is not a point of disagreement with them. Some *alope* from Long Island entirely fill the slight gap left by my N. J. specimens between typical *alope* and typical *pegale*. It must be remembered too that typical *alope* varies also in the direction of a single ocellus in the yellow band. I believe that somewhere in Southern N. J. in the Pineries, will be found that belt in which *pegale* and *alope* fly together and intergrade. *Pegale* has been caught by Mr. Aaron and myself, and I know that *alope* has been caught there by others as well as myself. What I claim for *pegale*, is the same relation to *alope* in one direction, that is borne by *nephele* in the other. The *alope* figured in Bd. and Lec. is certainly this species, and in my copy, the larva has the yellow stripe across the feet, the upper white stripe is yellowish and the intervening space green, stippled with black. It agrees very well with Mr. Edwards description of some forms of *alope* larva; the chrysalis is different from that of *alope*, but slightly so, and perhaps but little more so than in *olympus* which is classed as an undoubted variety.

Form **nephele** Kirby. The difficulty with *pegale* is repeated in this species, but as the fact that it intergrades with *alope* is entirely well settled, I need only briefly describe it. Generally smaller than *alope*, seldom expanding more than 1.5 inches; color darker, more blackish, the yellow band entirely wanting, the ocelli reduced in size, sometimes without centre, and occasionally only with a hazy yellowish areole round the spots: the anal ocellus is usually present, and beneath, the full number of ocelli on secondaries is usually more or less completely indicated. From this type form there are variations in the direction of *alope* in certain localities, and principally in the catskill mountains. These intergrades fill up the difference in size between the type forms, the ocellate spots of primaries become larger, and from an indistinct yellowish ring, up to the complete yellow band, all intergrades are found. I have collected all the forms, in the vicinity of Lexington, N. Y., and in the Shandaken gap, a place very much like Stony clove, and but a few miles west from it. On the hills in the meadows I find the intergrades most numerous, a few

typical *alope* forms, but very few *nephele*: in the deep valley beginning near Westkill, the reverse is the case: a typical *alope* is a rarity, but the intergrades and the *nephele* type are common.

Var. *boopis* Behr. This variety is distinguished from *nephele* principally by the fact that it occurs in Calif. and the Western States, and by the absence of ocelli beneath, on secondaries. In size and general appearance the insect resembles a *nephele* intergrade in the ♀, and in a series of specimens from the catskills compared with a like series from W. T., specimens precisely identical were found. The ♂ most closely resembles, the ♂ of the type *nephele*, but the W. T. and California specimens have as a whole, a smaller number of ocelli on secondaries; never having six, though one specimen has five. It is at most a poor variety.

Var. *olympus* Edw. This form is the one prevalent west of the Mississippi, and is also found in Ills. It is like the typical *nephele* but somewhat darker as a rule: I cannot separate some specimens of *nephele* from the catskills, from typical *olympus* from Mont., Ind. T. & W. T., though Mr. Edwards claims that both larva and chrysalis have become modified. Judging from my series of imagines, this is but a poor variety at best.

Var. *ariane* Bd. Mr. Edwards (l. c.) seems not to have any great faith in the validity of this species, and thinks it may be matched by a series of *nephele*. I have one example from Soda Springs labelled *ariane* by Mr. Edwards and agreeing with the description of the species. From W. T. collected by the survey, I have 19 specimens selected from a series of 40—50 with the view of getting specimens showing variations. Eleven of these examples are ♀ ♀ and of these, three agree perfectly with the soda springs example, and the others run gradually into *boopis*: six of the specimens have additional or rudimentary ocelli, four with one on each side of the lower ocellus, and two with one on the lower side only. But one ♂ shows an additional ocellus, the others run to the *boopis* type, and so gradually and completely, that some specimens can be with equal propriety placed in either variety. Of *boopis*, the collection shows but 3 ♀ ♀ (i. e. my selection of the catch) while there are 7 ♂ ♂, and with the ♂ *ariane* a full and unbroken line from one into the other is formed. The chief point relied upon by Mr. Edwards to distinguish *ariane* is an indentation in the outer line of the band of secondaries opposite the cell, which is wanting in type *alope* or *nephele*, and is very distinct in typical *ariane*; but my series shows the gradual obsolescence of this feature in *ariane*, and indications of it in undoubted *boopis*. Above, *ariane* strongly resembles the catskill intergrades, having the ocelli surrounded by yel-

lowish rings (♀s more particularly) often so large that they join and form a clouded, irregular band. The anal ocellus is sometimes complete, often entirely absent, but more usually faintly indicated. Beneath, on secondaries the ocelli vary in number; never entirely absent, but always more or less indistinct. One ♀ specimen is peculiar in the strong markings, mimicing *Baroni* in this respect: the under surface is unusually pale: the apices of primaries, and space beyond the discal band of secondaries is distinctly greyish white: the lines bounding the discal band of secondaries are very distinct and dark, and are continued across the primaries: the intervening space is darker than the other portions of the wing, and the appearance is as of a distinct dark band across both wings: there is a small third ocellus on primaries, pupilled on underside only. Above, the appearance does not differ from typical specimens.

Var. *incana* Edw. Of this variety a single typical example is among my selection, and several intermediate forms connecting it with *boopis*. On the upper side the forms are not distinguishable from eastern *nephele*; beneath, this variety is gray white, most evidently so at the apex of primaries and at the extra discal area of secondaries. Several other specimens are paler than typical *olympus* or *boopis*, and the connection is so complete and gradual, that I cannot believe this form entitled to a distinct varietal name.

In the Can. Ent. (*loc. cit.*) Mr. Edwards very fully described the larva of this species and some of its varieties.

Var. *Gabbii* Edw. This species I saw in Mr. Hy. Edward's collection, and find it nothing but a variety of *nephele* with pale underside and distinct ocelli. The ♂ above is like *nephele*, except that there are usually two ocellate spots on secondaries; beneath, as above mentioned very pale, and the ocellate spots distinct. The ♀ is much paler, with a broad clouded yellowish band on fore wings, and an obscure yellowish shade on the outer half of secondaries, but not stronger than in some specimens of *ariane* that I have seen. Secondaries with from two to four spots above. Beneath, general color paler than in the ♂; the discal stripe in both sexes obsolete, resembling the *Texana* variety.

Hab. Utah to Oregon. Expands as *nephele*.

S. Meadii, Edw. Tr. Am. Ent. Soc. IV, 79 (*Erebia*). Mead, Wheeler's Rep. V, 774.

This species is most nearly allied to the *Silvestris* series, and is easily known by the rufous tint of the primaries, usually most distinct beneath,

and in the extra discal space above; on the upper side often only the ocelli are faintly ringed, while usually an indefinite band is formed, and sometimes the rufous tint is entirely wanting in which case the insect looks like a small *nephele* except for the more pointed wings. The anal ocellus of secondaries is more or less distinctly present in all the specimens I have seen, but in the ♂ often lacks the pupil. The ocellate spots in the primaries vary in number: in the ♀, two distinct pupilled ocelli are found in all the specimens I have seen: in the ♂ some have one complete ocellus, the second indicated by a mere dot, others have two complete ocelli while in one specimen there is a second ocellus, smaller than, and touching the upper, and a distinct black dot between this and the lower ocellus. Beneath, the primaries are more suffused with reddish, the tint varying in intensity. In one ♀ specimen the rufous tint is very faint, and the maculation and distribution of the marking precisely agree with the *incana* form of *nephele*. The secondaries have the discal band as in the *alope* group, the extra discal space varies in color in my series, from dark brown to pale grey, and the spots number from 1 to 6 and vary in size and distinctness in all the specimens seen—in fact I have not yet seen two specimens of this species which were exactly alike.

Expands $1\frac{2}{3}$ to $1\frac{7}{8}$ inches. *Hab.* Mont

A. sthenele Bd. Ann. Soc. Fr. 2me ser. X, 308: Strk., Lep. Rhop. et Het. p. 30, pl. 4, var. *Paulus* Edw. Can. Ent. 11, 50.

Above, the ♂ is like *boopis* or *sylvestris*, the anterior ocellus usually pupilled, the posterior usually blind and occasionally obsolete; a blackish dash below the cell; fringes pale, cut with dark, but variable in this respect; anal spot of secondaries more or less distinct in most specimens, but occasionally wanting. Beneath paler; primaries with the ocelli larger, more distinct, with yellow rings. Secondaries with an irregular dark brown mesial band, very strongly marked; the inner margin crenate, the outer dentate and scolloped: at either side of this band the wing is very pale gray, gradually shading to dark brown at base and outer margin. The ♀ is larger, paler, the ocellate spots of primaries with yellowish rings, and sometimes there is an indistinct clouded band, approaching the *alope* type. The ocelli of secondaries vary from 1—6, usually 2 or 3.

Expands 1.2 to $1\frac{3}{4}$ inches. *Hab.* Cal., Nev., Mont., W. T.

From the collection made by the survey I have 14 specimens and from Mr. Graef and in my collection I have several more, the sexes about equally represented and varying from *sthenele* to type *paulus*, though none are quite as strongly marked as California examples of *sthenele*.

The species is easily distinguished from *sylvestris* by the form of the inner margin of discal band of secondaries, and by the distinct line bounding the extra discal pale space of primaries. Mr. Edwards seems to have taken a dark ♀ for the ♂ of *paulus* because he says the black sexual dash is wanting. In all my ♂ specimens, unquestionably type *paulus*, it is present. The only difference I can find between *paulus* and *sthenele* is that the former is larger, the contrast of color on secondaries is less marked, the outer margin of discal band is not quite so irregular, and the ocelli are usually more completely represented. However my series entirely fills the differences between the two. In Mr. Hy. Edward's collection I have seen type *sthenele* from California.

S. Baroni, Edw. Can. Ent. 12, 91.

Of this species I have 2 ♂s and 1 ♀ from Montana, decidedly belonging to this species, but differing somewhat from the typical form described by Mr. Edwards: the latter is "of a cinereous brown, a little dusky over the basal area of fore wings; the underside is light brown with a yellow tint throughout, and over the whole area beyond the discal stripe on hind wing there is a gray shade either whitish or brown gray. On this part of the wing the fine dark streaks are obliterated, and the two stripes being heavy and dark, while the intervening space is also darker than other parts of the wing, there is a strong contrast of color between the extra discal area, and this so-formed band. The indentation in the outer stripe of *ariane* is here present, but is deeper. The small ocelli are normally six, but in half the examples they are more or less wanting, and are always very small." The females are a little larger and paler (especially beneath) than the males. On the upper side, the primaries have two ocellate spots usually more or less indistinct, and always more distinct in the ♀s. The anal ocellus of secondaries is sometimes present, sometimes absent, and in no specimen that I have seen is it complete.

Mr. Edwards compares the species with *ariane*, but it seems to belong by the wing form rather to the present group. My Montana specimens agree perfectly in maculation and form of discal stripe on secondaries with the type form, and can be no other species; but the color of secondaries is rather less contrasting, and while one ♂ will fit very well into the typical series, the others have the extra discal space merely powdered with grey, and the band is scarcely contrasting.

Expands $1\frac{1}{2}$ to $1\frac{3}{4}$ inches. *Hab.* Calif. and Mont.

S. sylvestris Edw. Pr. Ac. N. Sc. Phil. 1866, 162; *oetus* Bd. Lep. Cal. 1869, 63.; Edw. Can. Ent. 12, 55 (pr. syn.); *phocus* Edw., Tr. A. E. Soc. V, 14; var. *charon* Edw. Tr. A. E. Soc. IV, 69.

The typical form of this species is of the usual smoky brown color, the ♂ with *two* small blind ocelli on primaries and the usual black sexual dash beneath the cell. The under side is tinted yellow, the ocelli are larger, pupilled and ringed with yellow. Secondaries with a broad discal band, more or less distinctly marked, outlines very irregular "on the outer side against the cell two long serrations projecting with a sharp and deep sinus between them", on the inner side dentate and scalloped. The ♀s are larger, paler, markings beneath more distinct, ocelli of primaries above, larger, pupilled and ringed, anal ocellus of secondaries usually present. Mr. Edwards refers *oetus* Bd. as a synonym and as he has the type he is probably correct in this.

var. *charon* Edw. Mr. Edwards says of this insect, comparing it with *sylvestris*, that it is usually smaller, the ♂ with a *single* blind ocellus, the ♀ with two ocelli with faint yellow rings. Beneath, yellow tinted, secondaries sometimes with a faint gray shade beyond the band; primaries with two complete ocelli, the rings yellow, but the lower one often reduced to a black dot.

Phocus Edw. This is said to be a modification of *charon*: a little larger, beneath without gray, the band of secondaries frequently wholly absent but sometimes sufficiently indicated to show that it is like *sylvestris*.

Taken together all these forms are separated from all our other species by the jagged outlines of the inner margin of the discal band of secondaries, and by the lack of a complete transverse line on the under side of primaries just within the ocelli—a character which Mr. Edwards does not seem to mention in his paper. In most specimens there is no trace of it, but in a few it is badly indicated and is so far as my material is concerned, never complete.

In the series before me are 15 *sylvestris*, 10 *charon* and 6 *phocus*, the ♂s predominating in the proportion of 2 to 1; most of these are from the collections of the survey, but some are from Calif., Nev., Mont. and Col. The specimens from W. T. were carefully selected from the large number collected, as variations, and I have formed a complete series from *phocus* to *sylvestris*. I have specimens (♂) with two distinct ocelli, (blind always) with one distinct and one faint; ditto on one wing, one only on

the other; a single distinct ocellus; a small ocellus; and two specimens in which the ocelli are obsolete and only perceptible *through* the wing, as a faint shadow from the under side. Beneath, the ocelli are much more distinctly marked in all forms, two in number, often both complete, but in many cases the lower one reduced in size and without centre. The secondaries vary in the number of ocelli from none at all, to six; usually four, and these mere white dots, sometimes with a darker circle (in pale specimens): in color they vary from grayish white with a very distinct discal band, to dark yellowish brown; the band remaining distinct, the borders black; in another direction the variation tends to the more uniform distribution of color: the discal band becomes obsolete, and the wing becomes of a uniform yellowish to dark brown color. All shades of color and all grades of distinctness of marking are represented, and while it is possible to range most of the specimens under the three forms here described, there are some which fit equally well in either, and the conclusion that they are one and the same is irresistible.

It follows from the preceeding, that the species of the genus *Satyrus* should be arranged as follows:

GROUP I.

GROUP II.

- | | |
|----------------------------|--------------------------|
| 1 <i>Wheeleri</i> Edw. | 3 <i>Meadii</i> Edw. |
| <i>Hoffmani</i> Strk. | 4 <i>sthenele</i> Bd. |
| 2 <i>alope</i> Fabr. | <i>v. paulus</i> Edw. |
| <i>form pegale</i> Fabr. | 5 <i>Baroni</i> Edw. |
| <i>form alope</i> Fabr. | 6 <i>Silvestris</i> Edw. |
| <i>v. maritima</i> Edw. | <i>oetus</i> Bd. |
| <i>v. Texana</i> Edw. | <i>var. charon</i> Edw. |
| <i>form nephele</i> Kirby. | <i>phocus</i> Edw. |
| <i>v. boopis</i> Behr. | |
| <i>incana</i> Edw. | |
| <i>v. olympus</i> Edw. | |
| <i>v. ariane</i> Bd. | |
| <i>v. Gabbii</i> Edw. | |

Carabidæ confined to single plants.

Although many species of Carabidæ are frequently met with on various plants, especially at night time, yet it is but natural to expect from their predatory habits that they are not confined to single species or genera of plants. Still there are among the bark-living species a few that are thus confined, *e. g.* certain European species of *Dromius* and, in

our country, *Morio monilicornis* and, perhaps, *Psydus piceus*, which, with their larvæ, live under pine bark. A small number of other species (*Aetophorus*, *Demetrias*, *Odacantha*) live in Europe preferable within the stems of *Phragmites*, and our *Dromius atriceps* Lec. appears to have similar habits as it was found to occur in large numbers within the dried stems of a stout grass growing in thick bunches near the beach at Fortress Monroe, Va. A fourth species in our fauna, *Onota floridana* Horn, is, in my experience, confined to the Cabbage Palmetto (*Sabal palmetto*) as all specimens observed thus far by Mr. Hubbard and myself were invariably found upon the leaves of that tree concealed between the ribs and not easily dislodged from their hiding places. A larva found at the same place seems to belong to this *Onota* which no doubt feeds upon the numerous larvæ of other species that live between the leaf-ribs. As *Onota floridana* is one of the most conspicuous species of our Lebiinæ it could not have been easily overlooked should it occur also under other conditions and I believe that it must be added to the fauna peculiar to the Palmetto tree. This fauna is very rich in species and contributes much to distinguish the Coleopterous fauna of Florida at once from that of the other Southern States. E. A. SCHWARZ, Washington, D. C.

Description of the genus ENDEODES (Malachide)

by JOHN L. LECONTE, M. D.

Reprint from James Thomson's *Arcana Naturæ*. Paris 1850, vol. III, p. 122.

ENDEODES, Lec.

This genus while agreeing with *Atelestus* in the absence of wings and the shortness of elytra differs essentially in the anterior tarsi of the male, the second joint of which is obliquely prolonged above as far as the end of the third joint, precisely as in many species of *Anthocomus*: the epistoma is membranous and quite distinct, while in *Atelestus* it is described as indistinct. These two characters are sufficient to warrant the Californian species [of *Atelestus basalis* Lec., Proc. Ac. Phila., VI, 168, San Diego Cal.] being considered as a distinct genus. To this genus also belong *Atelestus abdominalis* and *collaris* Lec. l. c., also from the coast of California; in the first the head and thorax are red, in the latter, the thorax alone.

Thomson's *Arcana Naturæ* being extremely scarce and containing but the above description of a new genus, we have reprinted it. Besides this it contains the description of 21 species, formerly published in North American periodicals and the figures of 20 of these species.

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Errata et Addenda.

Page 5 line 18 for "thought" read thought.

" 6 " 25 for "surfacer" read surface.

" 13 " 28 for "hnd" read hind.

" 22 " 32 for "the middle ♂ and" read the ♂; the middle and.

" 33 " 32 for "formed" read found.

" 33 " 34 after "inner" omit are.

" 36 " 1 for "tables" read Department.

" 36 " 11 for "stook" read took.

" 38 " 28 omit "Chrysalis".

" 45 " 5 for "Achylodes" read Achlyodes.

" 62 " 14 for "socond" read second.

" 66 " 4 from bottom for "197, pl. 35, Pearson;" read I, 97. pl. 25, Caulfield.

" 67 " 4 for "Edw l. c." read Tr. A. Ent. Soc.

" 67 " 10 before 378 insert 2.

" 67 " 20 for "Fdw" read Edw., also for "pl. 2" read pl. 3.

" 68 " 13 after Ed. Butt. N. A. insert 2.

" 82 " 30 for "Querín" read Guérin.

" 83 " 32 " " " " " " " " " " " "

" I of No. 8 (Dec. 1883) line 8 for "Philapetphia" read Philadelphia.

" 85 line 14 for [Pitatei] read [Pilatei].

" 113 " 12 for "There" read Three.

" 121 " 20 for "perpurea" read purpurea.

" 124 " 12 second column for "marginatis" read marginalis.

" 127 " 18 for "the lenticular and" read and the lenticular.

" 128 " 1 & 2 for "from" read form.

" 128 " 3 from bottom, for "is of a more reddish," read is of a deep, dark smoky brown, the yellow band distinct, more reddish.

" 130 " 10 omit "the" at the beginning of the line.

The word "*silvestris*," wherever it occurs in the synopsis of *satyrus* should be *silvestris*.

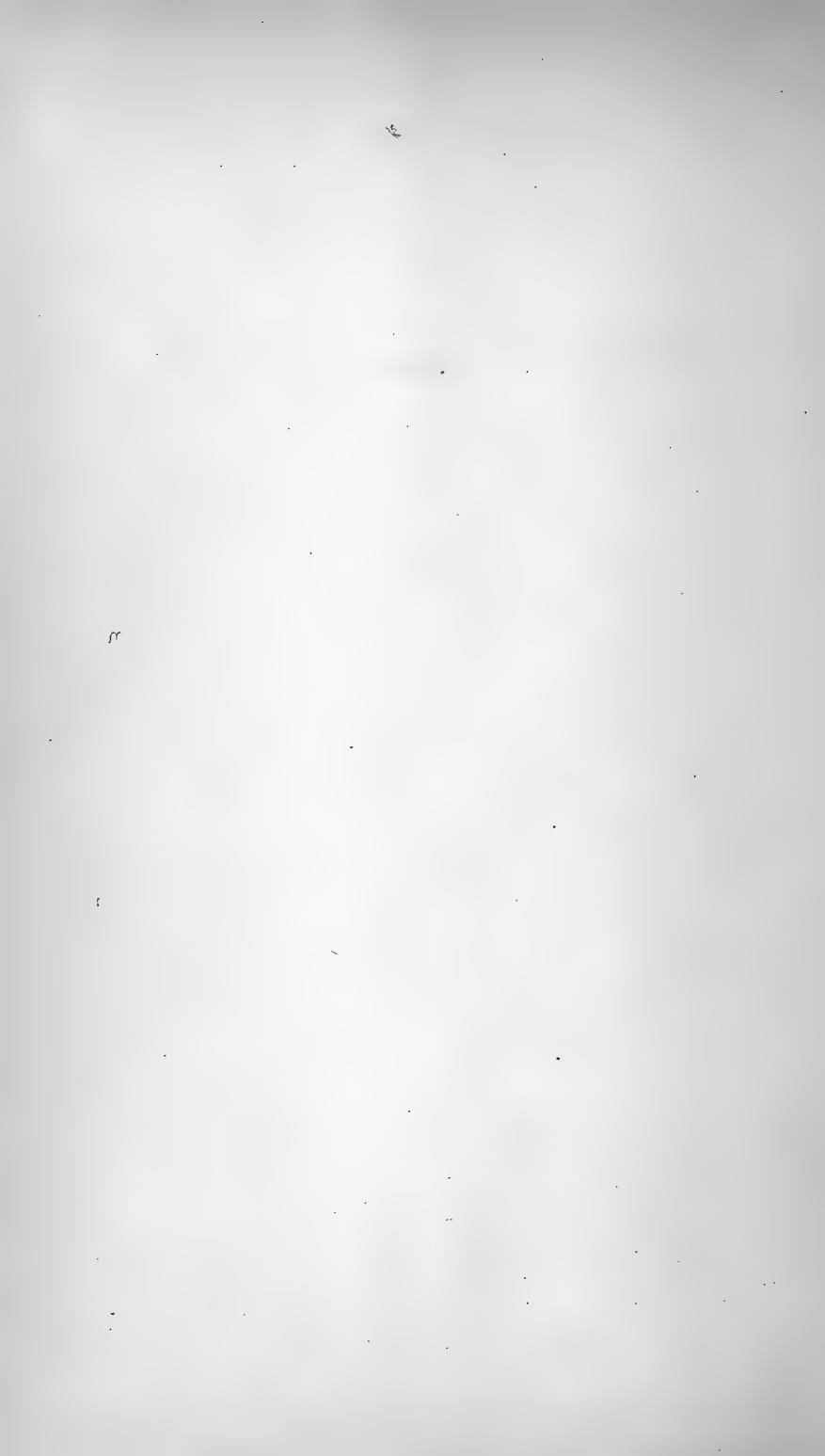
BULLETIN
—OF THE—
Brooklyn Entomological
SOCIETY.



VOLUME VII.
BROOKLYN, E. D.

MAY 1884.

—
APRIL 1885.



BULLETIN

—OF THE—

Brooklyn Entomological Society.

VOL. VII.

BROOKLYN, MAY, 1884.

No. 1.

To our Friends and Subscribers, Greeting.

We present you herewith number one of the seventh volume of our Bulletin. In vol. VI we tried the experiment of enlarging our paper, and presenting a somewhat greater variety of matter. The promises made in the Introductory we think were kept, so far as space allowed us to keep them. The support accorded to us was not all we had hoped for, but was still sufficient to encourage us to preserve. We shall make the numbers of the present volume of the same size as those of the last—12 pages. We shall, as in that volume, present Synopses of both Coleoptera and Lepidoptera; some descriptions of new species; life histories; descriptions of larva; papers of general interest; and a series of introductory articles on Coleoptera and Lepidoptera; designed, in the case of Coleoptera as an introduction and aid to the use of the "Classification"; and in the case of Lepidoptera, to explain to beginners and students generally the characters of the families and genera, and how to place, at least approximately, any lepidopterous insect that may be found. These papers will be illustrated. In number 2 or 3 we will begin a monograph of the American *Calocala*, to be illustrated by a plate giving structural peculiarities.

We earnestly ask that our friends do aid us; first, by sending in items of interest, and occasional articles; second, by recommending our paper to their entomological friends; third, by sending in their subscriptions at as early a date as possible.

Money orders should be made payable to the society, and they, as well as all communications should be addressed to JOHN B. SMITH, Editor, 290 Third Ave., Brooklyn, N. Y.

THE PUBLICATION COMMITTEE.

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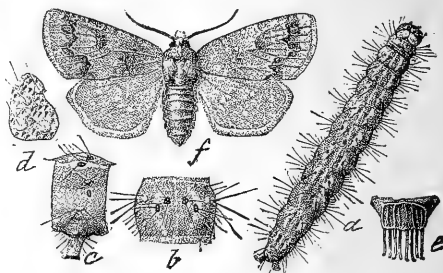
Acronycta betulæ, N. Sp.

BY PROF. C. V. RILEY.

An interesting and easily recognized species of the genus *Acronycta* has, to some extent, been distributed by me under the above MS. name and I would herewith characterize it:

Acronycta betulæ, N. Sp.

Average expanse 37 mm. General color clay-yellow or pale buff with silver-gray hues. Maculation subobsolete, except the t.p. line. Form of body and wings most nearly approaching *tritona*, i. e. primaries short, broad and with apex rectangular. None of the ordinary longitudinal marks at base or between veins 1 and 2 or 6 and 7: the ordinary maculation much



Acronycta betulæ: a larva, dorsal view; f imago-nat. size; b a middle segment of larva, dorsal view; c do. side view; d portion of larval skin showing spinose covering; e cremater of pupa with spines, dorsal view.

as in *innotata* but in faint fuliginous and sienna; orbicular usually quite obsolete; where indicated it is by relief basally of the t.a. paler line and posteriorly by the paler space between it and the reniform which is more plainly indicated, especially on the basal side, by a sienna border. T.p. line as in *Grafii*, the inner angle between veins 6 and 7 more pronounced but without the tooth of *tritona*, the outer angle on vein 1 more pronounced and acute; well relieved basally by silver-gray and posteriorly by a sienna-brown line and coincident subterminal shade. Posterior border usually shows a distinct pale line, the fringes being either of the general hue or darker with paler interruptions on the veins. Secondaries well rounded, clay-yellow with very faint discal and transverse, fuliginous shade. Head and thorax concolorous with primaries except a slender brown streak on outside border of tegulæ. Under surface uniformly pale clay-yellow with discal and transverse shade on secondaries intensified, and similar shades on primaries, the transverse line strongly elbowed: borders of wings, especially of secondaries, may also be dotted with brown though usually concolorous: antennæ beneath, front tarsi and a patch on outside of palpi dark brown.

♂ usually more strongly marked than ♀. Claspers of ♂ consisting of a long curved hook with a broad excavate main shank and an inferior broad tooth or projection having parallel sides.

Described from 9 ♂s 4 ♀s reared from larvæ feeding on *Betula nigra*.

Larva. Average length when full grown 38 mm. Color greenish-gray before last molt with a whitish medio-dorsal, and an undulating sulphur-yellow subdorsal line, more or less distinct. After last molt vinous-brown without the dorsal lines. Sparsely covered (head and legs included) with short white or gray hairs arising from pale papillæ and thickest at sides and subventrally, so as to give a somewhat gastropachiform aspect. The general surface of the body which appears smooth to the naked eye

is thickly and evenly beset with minute black points. Ordinary piliferous spots papillöse and pale except on dorsum where they are black with pale papillæ, usually 3 papillæ to each spot, except on thoracic joints where there are more. Head rather small, the tops of lobes reddish-brown the face pale yellowish with distinct black mottlings on the cheeks and bordering the red top. Stigmata with black annulus.

Pupa. Highly polished. Abdominal joints above sparsely and shallowly punctate. Cremaster consisting of a small series of converging ridges dorsally, and ending in some six or more short, almost straight spines in a horizontal row.

A strongly marked species. In some of the paler specimens there is a suggestion of olivaceous; while the darker specimens have more uniformly gray primaries with the strongly relieved t.a. pale line, and brown reniform and subterminal space as the most prominent features.

The larva while young is found on the leaves and corresponds thereto in general color. After the last molt it rests stretched on the thickest branches of the tree and is fond of hiding in dark recesses. For pupation it forms a slight cocoon either among leaves or in old wood on the ground, or on the trunk of the tree. There are two annual generations at Washington, the first larvæ occurring in July and the second brood in October: while the first moths from hibernated pupæ appear in April and the second brood in August.

The species, both in the characters of its larva and of the ♂ genitalia, shows affinities with that group of the genus which includes *morula*, *occidentalis*, *furcifera*, *hasta*, *lobeliæ* and *radcliffii*; while the genitalia, alone considered, would separate it from *innotata* with which, especially the form *Græfi*, it otherwise shows the closest relationship. My studies of the genitalia of the genus have, however, so far led to no definite conclusions as to their real value in classification.

New Species of Noctuidæ.

By JOHN B. SMITH.

The following descriptions are published in advance from the manuscript of an exhaustive monograph of the *Noctuidæ* in preparation by myself and Prof. C. V. Riley. To save trouble in changing the name, should the species be described by some other author before the monograph is published.

Demas flavicornis, n. sp. Of a pale ash-gray color, sprinkled with black. Head paler, antennæ yellow. Primaries with base somewhat whitish on costal half; t.a. line very faintly indicated, and apparently oblique. Median space darker, relieved only by the pale punctiform orbicular. Beyond this dark median space, the wing is

nniformly gray, crossed by a slightly darker s.t. shade, outwardly determinate and somewhat dentate. Secondaries and abdomen uniformly mouse-gray. Beneath, whitish gray; primaries rather darker through centre.

Expands 1.30 inch. 34 mm. *Hab.* New Jersey.

This is the first species of this genus hitherto discovered in our fauna. *Demas* is characterized by naked eyes; soft membraneous tongue; unarmed legs; and by having the accessory cell of primaries on a stalk beyond the discal cell.

The type of the present species is in Mr. Graef's collection.

Bomolocha umbralis, n. sp. Color even, dull, smoky brown, primaries flecked with scattered violet scales, most numerous just beyond the t.p. line and at the apex. T.a. line scarcely discernible, broad, diffuse, hardly darker than ground color, thrice scalloped in its course. T.p. line distinct, dark, outwardly shaded by a narrow white line, and a few violet scales. S.t. line very faintly traceable as a zig-zag pale line. A row of terminal black dots. Stigmata obsolete; the small punctiform orbicular only visible. Secondaries evenly colored, immaculate. Beneath immaculate, somewhat paler ground color above.

Expands 1.12 inch. 29 mm. *Hab.* Florida.

This species is very distinct from all others heretofore described, in maculation and wing form; to a certain extent connecting *Bomolocha* with *Hypena*. The primaries while normally wide, have the apices acute, and slightly produced, while the secondaries are proportionately larger than in the other species of the genus. It is perhaps nearest to the *lætulus* variety of *deceptalis*, but differs from it and indeed all others, in the outwardly oblique curve of the t.p. line.

One ♀ specimen furnished the type.

Hypena decorata, n. sp. Primaries of a yellowish-brown ground color, with transverse lines and subapical shade darker, more blackish; a paler whitish shade beyond the t.p. line, and above the subapical darker shade. Along the costa, there is a series of narrow black lines which are traceable entirely across the wing, though, except in the white shade, they are nowhere as distinct as on the costa. T.a. line pale, shaded with dark brown, with a distinct acute outward angulation on the median vein. In the median space the cell is darker and there is a distinct black dash connecting the stigmata, which are represented, the orbicular by a round tuft, and the reniform by a narrow line, of raised scales. Another distinct tuft of raised scales in the submedian space near the t.p. line. The t.p. line is blackish; straight from costa to the submedian space, where it forms one broad, scarcely acute tooth. Beyond, the white shades off into the ground color to outer margin, interrupted by the punctiform s.t. line and the subapical black shade. Secondaries uniformly smoky. Beneath, smoky. Primaries with the discal dot, a transverse line and terminal shade, darker, and two small costal dots near apex bluish white. Secondaries with a discal darker transverse line.

Expands 1.25—1.35 inches, 33—to 36 mm. *Hab.* Cal. Vanc.

In wing form this species is close to *H. californica* Behr. differing however in maculation. The specimens of both species vary widely in ground color, in the distinctness of maculation, and in the course of the ordinary lines. The t.p. line however is constant, and serves to at once distinguish the species. In *californica* this line is inwardly oblique, and in the submedian space makes a long acute *inward* angulation, whereas in the present form, the line is nearly straight and the angulation is *outward*. It can not be confounded with either of the other described species and need not therefore be distinguished from them. Both sexes are in Mr. Hy. Edward's collection.

Helia borealis n. sp. Primaries glistening brownish black, immaculate. Secondaries paler also immaculate. Beneath dark ash-gray, immaculate.

Expands .75 inch. 20 mm. *Hab.* Maine, N. Y., D. C.

A rather common species, closely allied to *lubricalis* but entirely immaculate and uniformly smaller. It belongs to the genus *Pseudaglossa* of Mr. Grote, which can be regarded only as a section of *Helia* (*Epizeuxis* Hb.)

H. occidentalis new var. of ***lubricalis***. Larger, paler and more evenly colored than the type form. The white lines and shades are broad, distinct and sharply outlined; the usual dark lines obsolete, not darker than the ground color. Secondaries also paler throughout than in the type form.

Expands 1 4 inches. *Hab.* Calif. Vanc.

Although in general opposed to the wholesale creation of varieties, yet this form is so much larger, more evenly colored and so constant in the districts in which it occurs, that it is entitled to be considered at least as a geographical "race" or variety, and to remove all temptation to describe it as a species, I give it a varietal name.

Several specimens are in Mr. Hy. Edward's collection.

Zanclognatha obsoleta, n. sp. Above, uniform dark obscure brown or smoky. Primaries with a fairly distinct broad, upright, straight t.a. line, which is outwardly diffuse and indefinite, and inwardly determinate. The reniform is very faintly indicated by darker scales, and the t.p. line is traceable by minute blackish tufts of scales. S.t. line visible as a faint pale shade. Secondaries immaculate. Beneath, ash-gray, powdered with ochreous scales. Secondaries with a dark discal dot and two indistinct darker lines.

Expands 1.25 inch., 32 mm. *Hab.* Vermont.

A single ♀ specimen taken by Mr. C. H. Roberts at Manchester, Vermt., Aug. 3, 1883.

The species is nearly allied to *Z. laevigata* Grt. and may eventually prove to be a variety of it; the dark smoky-brown color and lack of definite markings, as compared with the bright yellow or ochreous colors

and distinct maculation of the type, are quite within the range of variation in the genus: the maculation where traceable is identical with that of *laevigata* and the characteristic t.a. line is distinct in the specimen before me. It bears precisely that relation to *laevigata* that is borne by *minimalis* and *marcidelinea*, to *ochreipennis* and stands on the same footing as a valid species, with the two former.

Heterogramma palligera, n. sp. Pale clay yellow or luteous, transverse lines and terminal shade, darker. T.a. line narrow, outwardly curved, sinuate. T.p. line narrow, denticulate or crenulate; angulate outwardly on costa, thence slightly oblique to the inner margin. A dark transverse shade through the median space close to p.t. line. Through the dark terminal space, the pale s.t. line. Beneath paler, faintly reproducing maculation of upper side. In the ♀ the stigmata are obsolete; in the ♂ they are distinct, moderate in size, concolorous and broadly ringed with darker yellow.

Expands .80—.90 inches, 21—23 mm. *Hab.* Cal. Fla.

Varies considerably in depth of ground color, the males being as a rule darker than the females, and the Florida specimens, darker and somewhat smaller than those from California. It seems not uncommon where found, and flies early. One Florida specimen bearing the date March 3. Types ♂ and ♀ in my collection, others in Mr. Hy. Edward's (California) and Prof. C. V. Riley's (Florida) collection. The latter taken by Mr. Koebele.

This insect is perfectly congeneric with *Phalænophana rurigena*. Mr. Grote's genus being synonymous with that of M. Guenee, *Heterogramma* must be hereafter used for both species.

Hints on Spring Collecting.

It is at this season that collecting under stones is most profitable. Many of the hibernated species are now found, and many species that have just left the pupa. Many minute forms also that at other seasons of the year are scarce, are now plentiful, if they are but carefully sought. When turning stones, do not select only the large ones, and if you see nothing under them, drop and leave them; but also take smaller, flat stones, pick them up and carefully examine the irregularities and crevices. Many species which escape observation in other ways are thus found. I have known a field to be gone over and nothing but common stuff found, and to be revisited half an hour later and dozens of good species collected. The reason was. the last collector was careful and searched closely; the first was in a hurry, desired to cover a large territory and found only larger and common forms.

CHAS. FUCHS.

SYNOPSIS OF COLEOPTERA.

In our previous volumes, the synopses have been almost entirely of *Cicindelidae* and *Carabidae*. The first family was completely monographed in our last volume: of the *Carabidae* there remain only a few of the large confused genera such as *Harpalus*, *Amara*, *Brachinus*, *Bembidium* and *Tachys*. These are in sad confusion, and need thorough study, which can not at present be accorded them; partly because Dr. Leconte's collection, which contains not only types, but also many new forms, is just now inaccessible for purposes of study; and also, because Dr. Horn who had agreed to do this work, is too much pressed with other business to devote that careful attention and study to these groups, which they demand. As soon as possible we will present synopses of these genera. Meanwhile Mr. Chas. W. Leng, who has for some years past made a study of the *Cerambycidae*, has agreed to prepare synopses in this family, and is to be considered authority for every thing not otherwise credited.

J. B. S.

The family *Cerambycidae*, which contains many of our most handsome and graceful insects has a peculiar habitus which renders them distinguishable at a glance. The fourth and fifth tarsal joints are anchylosed, the former being very small. The antennæ are filiform, usually long, often twice longer than the body, frequently inserted upon frontal prominences: front often vertical, large and quadrate; *pronotum* rarely margined: tibial spurs distinct.

Three subfamilies are recognized, distinguished as follows in the "classification".

Prothorax margined; labrum connate..... **Prioninæ.**

Prothorax not margined; labrum free.

Front tibiæ not grooved..... **Cerambycinæ.**

Front tibia obliquely grooved on the inner side..... **Lamiinæ.**

In the first sub-family, *Prioninæ*, the species are of large size, the colors uniform brown or black. The elytra are more or less coriaceous in appearance, becoming metallic and firmer in some of the genera with finely granulated eyes.

The tribes and genera into which this sub-family is divided in the classification may be distinguished as follows.

Eyes strongly granulated.

Prothorax pluridentate on the side.

Third antennal joint very long.....**ERGATINI.**

Head small.....**Ergates.**

Third antennal joint moderate, head large.....**MALLODONTINI.**

Mandibles ♂ not longer than head.....**Mallodon.**

Mandibles ♂ much longer than head.....**Stenodontes.**

Prothorax parcidentate at the side.

Metathoracic epimera parallel.

Antennæ filiform.....**DEROBRACHINI.**

Hind femora deeply sulcate beneath; punctured.....**Derobrachus.**

Hind femora less deeply sulcate; several short elevated ridges
on inner surface.....**Orthosoma.**

Antennæ imbricate.....**PRIONINI.**

Thorax with three acute teeth at side.....**Prionus.**

Thorax with a single distinct tooth at side.....**Homæsthesis.**

Metathoracic epimera narrowed behind.....**TRAGOSOMINI.**

Prothorax very hairy; a single acute tooth at sides.....**Tragosoma.**

Eyes finely granulated.....**PÆCILOSOMINI.**

Prothorax trapezoidal; smooth; obtusely toothed near base.....**Sphenosthetus.**

Prothorax roughly punctured; acutely toothed behind middle.....**Eliateropsis.**

ERCATES, Serv.

The only genus in our fauna belonging to the tribe *Ergatini*. Prothorax broad and finely punctured in ♂; narrower, sculpture very coarse, small teeth of lateral margin longer, more acute in ♀. Head small, eyes reniform; antennæ slender, 11 jointed, two thirds the length of the body in ♂, half the length of the body in ♀. rough with elevated punctures. Poriferous spaces on 3d joint small, inconspicuous, on the under surface near the distal end, gradually becoming larger, until the outer joints become entirely poriferous and irregularly reticulated with fine elevated lines, forming elongate cells, which are much less distinct or scarcely visible in ♂. Our single species is

E. spiculatus Lec. Journ. Ac. N. S. Phila., ser. 2, II, 1852, p. 110: Proc. Ac. Phil. VII. 218; Entom. Rept. 1857, p. 59, pl. 2. fig. 9a. ♂ *californicus*, White Longic., VII, 1, p. 37; Lacord. Gen. Col. 1869, p. 96, note 3; ♀ *spiculifer*, White loc. cit., p. 39.

The species is blackish or blackish-brown, the elytra of lighter brown and in ♀ frequently with yellowish transparent spaces. Length 1.75 to 2.50 inches, 55—63 mm. *Hab.* Pacific Slope and N. Mex.

STENODONTES, *Serv.*

The occurrence of *S. mandibularis* in Southern Florida requires the addition of this genus to our fauna. As defined by Serville (Ann. Fr. 1832, p. 173) it differs from *Mallodon* in the mandibles which are glabrous, and in the ♂ much longer than the head, and in the antennæ which are longer, reaching in the ♂ two thirds the length of the insect and about half in the ♀. The species is

S. mandibularis Fab. (*Prionus*), Syst. El. t. 2, p. 261; *exsertus* Oliv. Ent. t. 4, p. 17, pl. VIII, fig. 31.

The insect is dark brown, head and thorax more blackish, elytra somewhat paler. Easily distinguished by its very large size and the prominent mandibles of the ♂. The species is not common in collections, and is confined in our fauna to Southern Fla. Southward it is more common. Length 2.75 to 3.25 inches, 65—84 mm. *Hab.* Southern Florida.

MALLODON, *Serv.*

This genus also contains species of large size with the sides of the prothorax armed with numerous small teeth. The head is comparatively large, the eyes strongly granulated, distant, transverse, feebly emarginate. Antennæ are slender not exceeding half the length of the body in the ♂ and shorter in the ♀. The sexual differences are worthy of note. The prothorax in the ♂ is nearly quadrate, densely punctured, with smooth separate facets, while in the ♀ it is narrowed in front, more coarsely punctured towards the sides and uneven on the disk. The species may be distinguished by the following

SYNOPTIC TABLE OF MALLODON,

by G. H. HORN, M. L.

Mandibles nearly horizontal, prolonged in the ♂; sutural angle of elytra spiniform in both sexes.

Metathoracic episterna with inner outline concave..... *mandibularis*.

Metathoracic episterna with inner outline straight..... *dasystomus*.

Mandibles vertical, head somewhat deflexed; sutural angle spiniform ♂, rounded ♀.

Thorax very decidedly serrate..... *melanopus*.

Thorax rather crenulate than serrate..... *serrulatus*.

M. mandibularis Gemm. Col. Heft. X, 1872, p. 254; *gnatho* || Lec. Proc. Ac. Phila. 1858, p. 81; *dentiger* Lec. 1873, Crotch Check List, p. 82.

This species is recognized by Lacordaire as forming a distinct genus

Nothopleurus. In the ♂ the metasternum has two large densely villous spaces; in the ♀ the same portion is clothed with long soft pubescence. Color, uniform brown varying with individuals. From *dasystemus* its near ally, it differs further by the lack of the bright thoracic facets, by having the posterior angles obliquely and broadly emarginate, so that a prominent angle is formed before the base, and another at the base itself, and finally by the more slender mandibles having a strong tooth near tip and being only sparsely pilose internally. Length 1.25 to 1.75 inches, 30—45 mm. *Hab.* Southern States.

M. dasystemus Say, Journ. Ac. Phil. III, 326; Lec. Journ. Ac. Phil. 1852, 112; *melanopus* † Hald. ♂ Trans. Am. Phil. Soc. X, 31; ? *degeneratus* Thoms. Revis. 95; *costulatus* Lec. Journ. Ac. Phil., ser. 2, II, 1852, p. 111; *spinibarbe* † Hald. ♀. Trans. Am. Phil. Soc. X, p. 31.

The color is much paler than in the preceeding; besides the differences noted under *mandibularis*, this species has the under surface of head much less deeply excavated, and the gular margins are much less elevated. The genæ also are emarginate, while in *mandibularis* they are broadly rounded. Length 1.25 to 2 inches, 30—50 mm. *Hab.* South. St.

M. melanopus Linn. Syst. Nat. ed. XII, p. 623; Oliv. Ent. IV, 66, p. 18, pl. 12, fig. 46; *crenulatus* Drury, Ill. II, Ind. I, p. 86, pl. 38, fig. 2; *cilipes* Say, Journ. Ac. Phil. III, 1823, p. 327; Lec. Journ. Ac. Phil. ser. 2, II, p. 111; *biimpressum* Hald, Trans. Am. Phil. Soc. X, 1847, p. 30; *simplicicollis* Hald, l. c. Dupont, Dej. Cat., 3d ed., p. 342.

In this species the tibiae are densely ciliated on the inferior edge, and it was this character that induced Say to name the species *cilipes*. Otherwise sufficiently distinguished in the synopsis. The color is very dark brown—almost black, Length 1.75 to 2.25 inches, 45—55 mm. *Hab.* Florida, Ark. Tex.

M. serrulatus Lec., Proc. Ac. Phil. 1854, p. 82; Arcan. Nat. 1859, p. 127, pl. 13, fig. 5.

Readily distinguished from all the others by the characters given in the synopsis. Besides being crenulate rather than dentate, the margin of the thorax is also rather less reflexed than in the preceeding species. Length 1.75 inch., 45 mm. *Hab.* Texas. Color brown.

M. angularis Lec. Crotch Check List p. 83 is not described and must be dropped. It is *Stenodontes damicornis* Fab.

DEROBRACHUS, *Serv.*

Two species from the Southern States and California are contained in this genus. The form is more slender than in the preceeding. The mandibles are acute, horizontal, and alike in both sexes. The antennæ are 11 jointed, nearly filiform in the female, thicker at the base in the

male. The sensitive pores commence on the outer half of the 3d joint, and cover the whole surface of the 4th and following joints, arranged in longitudinal grooves, separated by fine elevated lines. The narrow epipleural portion of the elytra is transversely striate, forming a stridulating organ upon which the edges of the hind femora grate to produce a sound. The 5th segment in the ♂ is broadly emarginate, the 6th visible and also emarginate, while in the ♀ the 5th segment is elongate and truncate but the 6th is not visible.

The species are separated as follows:

Hind femora sparsely punctured; prothorax with three acute teeth. *brevicollis*.
Hind femora densely punctured; anterior tooth of prothorax double, sometimes divided. *geminatus*.

D. brevicollis Serv. Ann. Fr. 1832, p. 155; Hald Trans. Am. Phil. X, 1847, p. 31; Dej. Cat. 3d ed., p. 343.

The head and thorax are black, body testaceous brown; legs testaceous knees black. Elytra with three slightly elevated ridges. Length 2 to 2 25 inches, 52—58 mm. *Hab.* Southern States.

D. geminatus Lec. Proc. Ac. Phil. VI, 1853, p. 233; Col. of Kans. 1859, p. 19, t. 2, fig. 12, ♀.

This species is easily distinguished, not only by its large size, but also by the double anterior tooth of the thorax. The elytra are entirely smooth except at the base, where a few indistinct rugæ are visible. Pectus covered with short yellowish hair. Length ♂ 1.5 to 2 25 inches, ♀ 2.5 to 2.9 inches, 62—75 mm. *Hab.* Texas to Lower California.

ORTHOSONA, Serv.

This genus is represented by a single species:

O. brunneum Forst. Nov. Spec. Ins. 1771, p. 37; *cylindricum* Fab. Spec. Ins. I, p. 207; Oliv. Ent. IV, 66, p. 23, t. 1, fig. 6; *cylindroides* Gmelin ed. Linn. I, p. 4, 1818; *pennsylvanicum* De G. Mem. 1775 p. 99. t. 13, fig. 13; *sulcatum* Beauv. Ins. Afr. et Am. p. 526, t. 35, fig. 4; *unicolor* Drury, Ill. II, 1773, Ind. I, p. 83, t. 37, fig. 1; Casteln, Hist. Nat. II, p. 402.

The characters of this species are the same as given above for *Dero-brachus* and in the table of genera. The prothorax is tridentate and the color is light brown. Sexual differences may be found in the antennæ as in *Dero-brachus* and in the 5th ventral segment, which is rounded in the ♀, but broadly truncate in the ♂ leaving the 6th visible. The beetle is common everywhere in the Atlantic States, from June to September, and is attracted to light. The larva is said to live in the rotten stumps of pine (Pack. Guide 495, f. 478) and is credited also with eating into the roots of grape vines and sometimes destroying them. Length .90 to 1.75 inch., 22—40 mm. *Hab.* Atlantic States.

Editor's Department.

Excursions. It has been the custom of the Brooklyn Entomological Society for several years past, to have an annual excursion or field meeting, early in spring. These excursions were so popular, and the attendance was so large, that for the coming season a series of excursions has been arranged, under the charge of various members of the Society. At the April meeting a programme was adopted, and the following dates and places were fixed upon:

May 11, Staten Island,.....	Mr. A. C. Weeks.
“ 30, Clifton, N. J., (Annual Excursion).....	Mr. J. B. Smith.
June 8, Fort Lee, N. J.,.....	Mr. Geo. Gade.
“ 22, Rockaway, L. I., (Sea shore collecting)	Mr. J. B. Smith.
July 4, Clifton, N. J.,.....	Mr. Geo. D. Hulst.
“ 6, Flatbush, L. I.,.....	Mr. F. Tepper.
Aug. 17, Fordham and West Farms, N. Y.....	Mr. Geo. Gade.

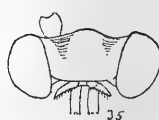
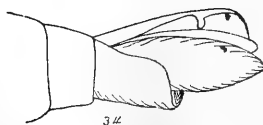
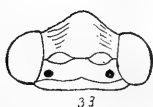
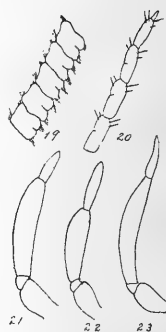
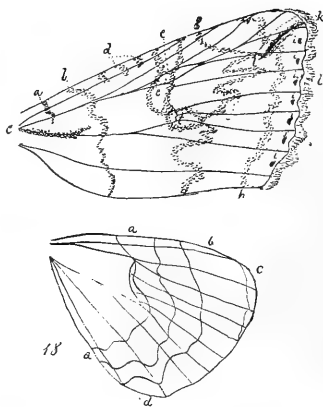
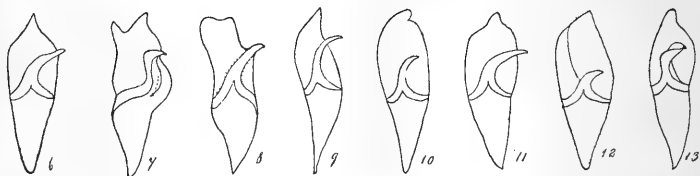
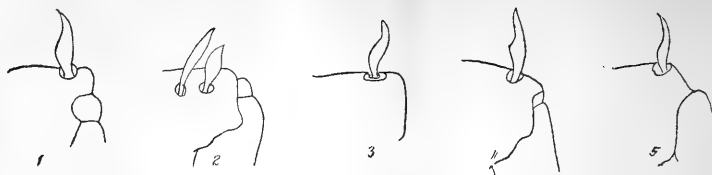
The first excursion, under the charge of Mr. Weeks, will be to Garrettson's Staten Island. Leaving N. Y. from Foot of Whitehall St. (South shore) at 9 A.M. The collecting will be in the woods to the South of the R. R. Station.

The second excursion, May 30, is the annual field meeting of the Society, and will be under the charge of the President, Mr. J. B. Smith. Leave N. Y. via Erie R.R. on the first train *after* 8 A.M., and the collecting to be done in the fields, woods, and shrubbery to the south east of the R.R. station. Other dates will be published in a future number. From the interest manifested, it is expected that the attendance at these field meetings will be large, and all persons interested in Entomology are cordially invited to attend, and further and more particular dates, as to these excursion, will be promptly and cheerfully given to all desiring same.

The Butterflies of Maine, by Prof. C. H. Fernald, designed for the use of the students in the Maine State College, and the farmers of the State. This book, of 104 pages, in pamphlet form we have just received from the author. It contains a synoptic table for the determination of the genera and species, and descriptions of the imago, and where known, the larval stages of the butterflies known to occur in Maine. It is very well written and is of use not only for the limited public mentioned in the title, but also to all New England Lepidopterists. A commendable feature is, the accentuation and division into syllables of the scientific names. Almost each collector has a different pronunciation of a given name, and uniformity is very desirable. This is a step in the *right* direction.

A less commendable feature, and to our view a step in the *wrong* direction, is the adoption of “common” or “popular” names for the butterflies; introducing such names as “The Mormon” for *P. zabulon*; “The sleepy dusky wing” for *T. brizo*; “The Wanderer” and “The Piebald” for *F. tarquinus* etc. etc. We are sorry to see that Prof. Fernald has given any countenance whatever to this practice.





Explanation of Plate I.

- 1 Femoral spur (*Gonyodon*) of *C. coccinata* ♂. ✓
- 2 " " (") "*Parallela bistriaris* ♂. ✓
- 3 " " (") "*C. Sappho* ♂. ✓
- 4 " " (") "*C. partu* ♂. ✓
- 5 " " (") "*Drasteria erecta*. ✓
- 6 Clasper of ♂ *C. piatrix*. ✓
- 7 " " "*C. Aholibah*; ✓
- 8 " " "*C. nubilis*. ✓
- 9 " " "*C. Ilia*. ✓
- 10 " " "*C. neogama*. ✓
- 11 " " "*C. Epione*. ✓
- 12 " " "*C. relict*a. ✓
- 13 " " "*C. cerogama*. ✓
- 14 Frenulum of ♂.
- 15 Frenula of ♀ (usual form).
- 16 " " "*C. gracilis* (occasional). ✓
- 17 Primary wing of a *Catocala* showing typical ornamentation. *a.* basal half line (b. line). *b.* transverse anterior line (t.a. line). *c.* basal dash. *d.* costal dots. *e.* reniform. *f.* sub reniform. *g.* transverse posterior (t.p.) line. *l.* M. of t.p. line. *h.* subterminal (s.t.) line. *i.* terminal dots. *k.* apical dash. Between base and t.a. line is the basal space. Between the t.a. and t.p. line is the median space, often crossed by a median shade, band, or line. Between the t.p. and s.t. line is the subterminal (s.t.) space. Between the s.t. line and margin is the terminal space.
- 18 Secondary of a *Catocala*. *a.* median band. *b.* terminal band. *c.* apex. *d.* anal angle.
- 19 Antenna near base.
- 20 " " tip.
- 21 Palpus of *C. cara* ♂. ✓
- 22 " " "*C. elonympha* ♂. ✓
- 23 " " "*C. ultrovia* ♂. ✓
- 25 Tarsal claw of *C. elonympha*. ✓
- 26 " " "*C. nubilis*. ✓
- 27 " " "*C. desperata*. ✓
- 28 " " "*C. amica*. ✓
- 29 " " "*C. Belfragiana*. ✓
- 30 " " "*C.* " var.
- 31 " " "*C. subnata*. ✓
- 32 " " "*C. amatrix*. ✓
- 33 Head of *C. ilia* from above. ✓
- 34 Tip of abdomen of *C. ilia* ♂. ✓
- 35 Head of *C. ilia* from front. ✓

THE GENUS CATOCALA.

By REV. GEO. D. HULST.

In the Bulletin of the Brooklyn Entom. Soc., vol. III, pp. 2—13, 1880, was published an article entitled "Remarks upon the Catocalæ of N. A. North of Mexico with a catalogue of the species."

The study prefatory to the publishing of that article, led to an interest in the genus, which has resulted in continued effort to attain knowledge of these most beautiful insects. At the request of some of my entomological friends, the study during a few months past has taken a form looking to the present monograph.

The genus *Catocala* embraces insects which are among the largest, most showy, and most interesting of the Noctuidæ. The genus is one of the Northern Hemisphere, is largely represented in Europe, Asia and America, and very sparingly in the North of Africa. Our own species surpass all others in number, size and variability of coloration.

Of the egg of our species, we know little more than has been given us in the careful and very valuable observations of Prof. Geo. H. French of Carbondale, Ills. He has in "Papilio", and the Can. Ent., given the life history of *cara*, *amatrix* and *Iliä*. The eggs of these species very nearly agree in being spheroidal in shape,—grooved longitudinally with many furrows,—flattened at apex and base, the flattened surface at the base being somewhat the larger. I have taken eggs from the abdomens of cabinet specimens of various species, (*nubilis*, *elonympha*, *ultronia*, *parta*, *lacrymosa*), and found them to agree, so far as I could judge, with the eggs spoken of above. The eggs remain unhatched, so far as Prof. French's observations go, until the following spring after being laid. With the possible exception of *nubilis*, I feel certain that no species is double brooded. Mr. A. Koebele of Washington D.C. obtained eggs of *Clintonii* in Florida, as early as March, but the larvæ did not emerge until the following year, in June, the eggs having been brought North mean-while. With regard to *elonympha*, all testimony leads to the conclusion that it is not double brooded. *Nubilis* is found at almost all times after early summer, and it may be true that more than one brood of it appears each year but I do not believe this at all probable. The insects under the observations of Prof. French remained in the egg state from about 180 to 250 days; those of *Clintonii* obtained by Mr. Koebele hatched only after 15 months had passed!

The eggs according to Mr. Koebele are laid in bunches of from 1 to 10 on the bark of the tree. Of course with their long exposure the large majority are destroyed by their enemies.

The *larva* is elongated, tapering towards both ends, is generally rounded above, and somewhat flattened below. The head is generally flattened, with the front nearly horizontal, so the mouth parts are projected forward, and is often divided at the apex. The abdomen is generally provided with protuberances on each segment; is largest at the 8th segment, which is marked generally with a dorsal lunule or protuberance, as is often the 11th. Generally the larvæ have curious scurfy fringes running in a substigmatal line, and coming next the flattened portion of the abdomen. Guenee seems to think they may serve the purpose of assisting the larva to cling more tenaciously to the surface upon which it rests. From repeated observations, I have been unable to see any such use made of them, and moreover they have no sucking disks, and seem to be devoid of muscular mobility. The larva may be said to have 16 legs, though according to Prof. French's observations, in the earlier stages of larval history, the two abdominal pairs are nearly obsolete, and in some species as in *micronympha*, (*fratercula* Grt.) they remain so, and in the early stages may not exist at all. In all the species the larvæ are semi loopers, hunching up the back in walking. The spiracles are as usual oval, fringed with hair within, and present, so far as I have observed, no variation.

The larva is arboreal and nocturnal. It lies concealed and quiescent during the day under or in the crevices of the bark, or in the grass at the base of the tree or shrub on which it feeds. I have noticed that the larva often returns to the same place of concealment day after day, following probably a silken thread left as a guide. The larvæ of the same species are somewhat variable during the different stages of development, the head being comparatively larger, the body flatter, the segments much more nearly of the same size, and the abdominal legs with a greater lateral projection in the earlier stages than in the final one. There is also a decided variation in coloration, and in the abdominal protuberances. In the same stage, there is in my observation much variation in the same species in the ground color, and in the size and distinctness of the markings and protuberances. I believe the larva is somewhat mimetic, and to an extent approximates the color of the bark of the tree on which it feeds. The larva has at least 4 moults during its history. Prof. French records that *cara* and *amatrix* go through 5 each,

and *Ilia* through 4 only. This is certainly a very remarkable variation if it be the ordinary history of each of these species.

But there is sometimes variability in this respect in the history of some species; I learn from the very valuable report of Prof. Lintner, of Albany, N.Y., for 1883, that in some species of Lepidoptera the female goes through one more moult than the male in the larval state. It may be that this is the case with the *Catocalæ*.

Many collectors in this vicinity, myself among the number, have believed that the larvæ of some *Catocalæ* hibernated, as very early in the spring large larvæ were found. Prof. French has cleared up this mystery by showing that the larva emerges very early, and feeding upon the buds before the leaves have opened, becomes often nearly full grown before the leaves are much expanded. The development of the insect during the larval period is always rapid, rarely if ever reaching beyond a month.

The larva ordinarily pupates under the bark or at the base of trees, or under any convenient cover. It makes a slight cocoon of leaves or frass and silk. The larva of *nubilis* often goes just beneath the surface of the ground to pupate. The pupa is not more than ordinarily elongated, is cylindrical, without protuberances, and is covered with a bluish bloom. The pupal stage is comparatively lengthened, reaching in all cases as long as the larval period, and the pupa of *nubilis* hibernates.

The *imago* is almost strictly nocturnal in this country, though instances have been noticed of voluntary flight and feeding by day. The imagines generally hide during the day under cover of bark, shrubbery and grass, or sit exposed upon the bark of the trunk of trees, whose appearance they mimic with wonderful exactness. They are easily disturbed, but when disturbed, rarely fly to a great distance, often not further than the opposite side of the tree. They feed upon the honey of flowers, and the juices of fruit, and are readily taken at sugar.

STRUCTURE OF THE IMAGO.

The *head* is rather large and prominent. The mouth parts are of the normal noctuid character, with the *tongue* strong, well developed, and capable of reaching to the extremity of or beyond the thorax. The *front* is rather broad and full. The *clypeus* is somewhat variable, ranging from a nearly flat to a decidedly conical surface, but without any indentations. The *eyes* are prominent, round and naked. The *palpi* are heavy, well developed, quite erect, reaching well up the front. The first

joint is short as compared with the second, and the third is variable, ranging from as long as the second, to only one-fourth or one-fifth its length. There is also a sexual variation, the third joint being in some cases slenderer and more produced in the female. The variation in this respect is in some species quite considerable.

The *antennæ* are ciliate, scaled and hardly fringed with hair above, and with slight tuftings of hair below, on each joint. The sexual variation is very slight, and this is also true of the specific variation. The joints are comparatively shorter and more compact towards the base, slenderer and more lengthened at the point. There is much variation in the number of the joints in the different species, ranging from about 60 to about 110. The number varies slightly in the same species, so it can not be made a basis for specific determination. The *ocelli* are two in number, situated near, and just behind the antennæ, and are black and prominent.

The *thorax* is rather stout and heavy, subquadrate, clothed with hairs intermixed with flattened scales, though in some species the hairs are almost wanting. It is somewhat more squammose in the male than in the female and is tufted posteriorly. The *patagiæ* are well developed, and reach with vestiture nearly or quite the length of the thorax; they are somewhat less appressed in the male than in the female.

In anatomical structure the thorax occupies a position between the typical *Noctuid* form, and that of the typical *Geometrid*. The proscutum is narrower, and more extended laterally than that of the typical *Noctuid*; the mesoscutum is much more slender and posteriorly extended; the scutellum of the mesothorax is shorter and posteriorly more rounded; the scutellum of the metathorax is shorter and broader laterally. I refrain from the discussion of the comparative anatomy of the thorax, beyond this, because my friend, Mr. John B. Smith, who has been somewhat of an inspiration to me in this line of research, is making a special study of this portion of the imago of the *Noctuidæ*, and I do not wish to anticipate his work. I will only say, that on the basis of thoracic structure, the affinities of the genus are as strongly with the *Geometridæ* as with the *Noctuidæ*, thus carrying out what has already been evidenced in the larva and pupa by their general appearance and habits.

The *abdomen* is somewhat extended, conical or cylindro-conical, considerably keeled dorsally in *nubilis*, less in others, (*Clintonii* etc.) and in others not at all; the tendency being, in all cases, more marked in

the female than the male. The abdomen is more or less tufted in all the species, on the anterior segments. The *spiracles* are as usual, oval linear. The *genital organs* are very prominent and marked in the male. There is a special and marked modification of these parts in the various species of the genus. The supra-anal clasper is narrowed and extended, and on the end is curved downwards, forming a strong corneous hook, laterally somewhat winged. In some species, this hook is more curved than in others. The lateral plates are subject to great and remarkable modifications. Except in *nubilis*, the clasper is independent of the plate itself, and consists of a strong corneous spur, rising from near the center of the plate, and varying very much in form. The commonest form is a somewhat flattened conical spur, curved inwards, pointed, divided below into two parts, (which are here contained in the membrane of the plate), extending to and supported by the strong borders of the plate itself. In *relicta* this spur is much shorter, stouter and more heavy; in *Epione* it is much longer, and more slender; in *Ilia* and *piatrix* it is yet longer, more slender and with a different curvature and shape; in *cerogama* it is very curiously flattened and curved; in *Aholibah* the modification is remarkable; the divided part is freed from the membrane of the plate, is greatly extended and curved, and the spur itself is almost obsolete as a spur. In *nubilis*, the spur, as well as the divided part, is enclosed in the membrane of the plate, and the clasper is formed by the projection of the spur beyond the edge of the plate.

So far as my observations have gone, the female genitalia correspond in form with those of the typical *Noctuid*.

From examination of cabinet specimens, I believe, that the eggs are not all fully developed when the imago emerges. The number of eggs probably runs up to as many as 400, laid by a single female. Prof. French had an *amatatrix* lay 292.

The *fore wings* are large, broad, triangular, somewhat arched along the costa, more or less pointed and extended at the apex. rounded, and very generally undulate on the outer margin, somewhat concave on the inner margin, and suddenly narrowing near the base. They are somewhat more narrow, pointed, and squammose in vestiture, in the male than in the female. The *hind wings* are large, undulate on the outer margin, with rounded apex, and with rounded, almost obsolete anal angle. For the markings which are in the main common to all the species I refer to figs. 17 and 18 of plate I.

The *vestiture of the wings* shows a variation in the shape of the scales

in some species, but I have not found the variation sufficiently marked to be of value in the determination of species or even of larger groups.

The *wings* are in *ornamentation* and *coloration* extraordinarily variable in the same species. In fact, in some species, there is nothing at all of these things which is not subject to wide variation. On the fore wings the ground color,—the color and limitations of the reniform and subreniform spots,—the transverse lines,—the subterminal line,—the basal and apical dashes, the shadings of the costal and inner margins and of the t. p. line and the reniform spot,—the shading of the basal middle and outer spaces, are inconstant. On the hind wings, the bands present great differences in width, outline, and color. In short, every thing seems to be inconstant in some species, and those that have very little variation, are few, and of these, the examples collected are few.

In *venation* the wings differ somewhat from that of the typical *Noctuid*. On the fore wings, the 5th venule is slightly more advanced towards the middle of the discal cell, showing again an affinity with the *Geometridæ*. The discal cell is very short, being less than one-half the length of the wing. On the hind wings, the venation is after the Noctuid type, save that the cell is remarkably shortened, being not more than one-third the length of the wing. The venation of both wings is given in figs. 17 and 18 of plate I.

There are, however, as relating to venation, some things which ought to have more than a passing interest to the student of systematic entomology. Upon the fore wings, we find extending inward from the outer margin between the 5th and 6th, and 6th and 7th venules, rudimentary venules, which however do not reach the outer margin of the cell. There is also a rudimentary vein reaching out from the base, dividing longitudinally the discal cell, and extending beyond it, to meet the one extending in from the outer margin of the wing. On the hind wing, the cell, which has generally, if not always been considered open outwardly, is really closed, though the cross vein is faint, and somewhat rudimentary. There is on this wing also, found a rudimentary vein, dividing the cell longitudinally, and extending towards, if not reaching the outer margin. With regard to the presence of all these, I have no guesses to make of a possible past or a possible future. But the presence of these rudimentary veins calls to our minds the venation on the one hand of certain of the *Bombycidæ*, and on the other of certain of the *Tortricidæ*, and suggests affinities which are somewhat surprising.

The hind wings are furnished on the anterior margin, near the base with an organ, called the *frenulum*.

In the male, it fits in a membrane, projecting from near the costa, on the under side of the fore wing, underneath which, longitudinally, it moves freely. This however, is nearly, or quite obsolete in the female, and in my observation does not cover the projections of the organ.

It has been thought to serve the purpose of holding the wings together in flight; this end may be served; but in view of the modification of the organ in the female, it is more likely an instrument more particularly to keep the hind wing from getting above the fore wing. The frenulum in the male is a strong corneous spine. In the female, there are with but one exception in my observation, three spines, much lighter and weaker than in the male. I was much surprised to find how incorrect an idea existed among entomologists concerning this organ of the female of the *Catocalæ*. Mr. Strecker in his catalogue of the Butterflies and Moths of N. A. 1878. p. 34, speaking of the frenulum of *Catocala* says "simple in male, and forked or double in female." Mr. Grote, in the years gone by, sneered at another, who was in doubt as to the sex of a *Catocala* whose abdomen was wanting, saying in effect, that any one who had the least knowledge of the anatomy of the *Noctuidæ*, would know that the frenulum was bifid in the female. And so late as August 1883, (Proc. Amer. Phil. Soc. XXI, pp. 135—36), he says of the *Noctuidæ*, "they have a simple frenulum, which is divided, (not 'double') in the female." The facts are, so far as the *Catocalæ* are concerned, the frenulum is simple and single in the male, but in the female it is not forked, divided, double, or bifid, but the only proper way to express it is that there are in the female three frenula;—for the spine is the frenulum, and there are three of these. There is an adaption of the wing to receive the spine; but the name must attach to the spine, and not to a section of the wing itself.

I found one ♀ *gracilis* with four frenula, but this is the only instance of hundreds examined, that I have found among the *Catocalæ*. I have never seen one with two only. These frenula can not, it seems to me, be looked upon as specialized nervules, as in the female each one is set in a sort of a socket, and in no case is the organ a continuation of any nerve in the wing itself.

Of the frenula of the *Catocalæ* females, the basal one is generally the shortest and most erect; the two others are of nearly the same length,

and curve backwards till they run nearly parallel with the margin of the wing. In a few instances, I have found the frenula slightly bulbed at the extremity.

The *legs* are somewhat lengthened, robust and powerful. The *coxæ* are rather stouter and longer than those of *Agrotis* being one-third as broad as long. The *trochanters* offer no observed differences. The *femora* are rather long and slender, and somewhat flattened, laterally. They are generally, if not always, covered within with long hair, which on the fore and middle legs becomes exaggerated. This is not a character special however to *Catocala*, but seems to be a tendency of the lower *Noctuidæ*. On the femur of the fore leg is an organ which seems heretofore to have escaped the observation of students of structural anatomy. I have found no mention made of it in the works of Guenee, Lederer, Herrich-Schaeffer, Burmeister or others. It is a special piece of armature, situated on the femur of the fore legs of the males only, near its juncture with the tibia, at the middle of the upper or frontal portion, and consists of a chitinized spine set in a socket. It is corneous, cylindrical, pointed at the apex, swollen in the middle, and narrow, almost pointed, at the base. It is ordinarily about one-half the diameter of the femur in length, and may be known as the *gonyodon*, (*gonu*, knee, and *odous*, tooth), or femoral spur. It is ordinarily hidden in the vestiture of the femur. Upon search I found it on the fore femora of the males of all the *Catocalæ*. It is also present in a number of the lower genera of the *Noctuidæ*, though wanting, so far as I have observed, in nearly allied genera such as *Syneda*, *Ypsia* (*Homoptera*), and the *Deltoids*. In *Euclidea* it takes a peculiarly curved form. In *Parallelia bistriaria*, and *Agnomonia anilis*, I have found in the place of one, two of these gonyodons present. This organ is subject in the *Catocalæ* to considerable variation in form, as may be seen from the figures of the plate. What may be the use of it I will not venture to guess.

The *tibiæ* are comparatively slender, though not lengthened. The *fore tibiæ* present marked differences in armature, which seem to have heretofore escaped the attention of our systematists, and which divide the genus into two divisions of subgeneric standing; the one *Catocala* proper, having the fore tibiæ unarmed, the other, which I will call *Catabapta* (*kata*, beneath, and *baptos*, dyed), having the fore tibiæ always, and generally very heavily spinulated.

The *middle tibiae* apart from the pair of great spurs, are always spinulated; generally much more heavily in the *Catabapta*, than in the *Catocala* group.

The *hind tibiae* are sometimes spinulated, sometimes not. Always and generally heavily, in the *Catabapta*, not at all, or but slightly, in the *Catocala* group. Many of the fore tibiae are heavily covered with long hairs on the inner side. So also on the middle tibiae, which on the males, in many species form large tufts. This however, is simply a tendency, very frequently found among the lower *Noctuidae*. After diligent and repeated search, with a compound microscope, on scores of denuded legs, I have not yet found the faintest suggestion of the scent organs spoken of by Prof. Lintner in his Report, p. 71 as found "at the upper part of the second pair of tibiae."

The *tarsi* present no special modifications. In length, as is usual, they vary as compared with each other. I have found a curious monstrosity in the tarsi of the fore leg of a specimen of *consors*. At the joint below the second segment from the tibia, two segments proceed, forming a double leg at the end.

The *claws* present marked and surprising variation. In the greater number of the species, they are single, rather stout, and curved strongly downward. From this they reach one way to the slender semicircular claw of *Messalina*, and the other way, to the form found in *nubilis*, *elonympha*, and *gracilis*, where the curve becomes almost rectangular on the outer edge, and on the inner side there is developed a thin angular membrane, (the counterpart of that in the claw of the lower *Noctuidae*), giving a distinctly bifid appearance. There is also a difference in what may be called the heel of the claw. In some, (*nubilis*, *elonympha*, *gracilis*) it is obsolete; in *Messalina* it is strongly prominent. I refer to the proper figures of the plate.

POSITION OF THE GENUS.

In view of what has been already said, it will be seen that from almost every point of view, the genus occupies a position between the typical *Noctuid* and *Geometer*. In my opinion, it is nearer the latter, than the former. And while, on the basis of venation, it must yet be classed among the *Noctuidae*, it ought to be placed closer to the foot of the list than it is; very close to, if not by the side of *Ipsia* (*Homoptera*),

and its allies, and these with *Euclidea* ought to be almost, if not quite at the end of the *Noctuidæ*.

LIMITATIONS OF THE GENUS.

The most of Lepidopterists probably are agreed, that many of the divisions called genera are artificial. But it is perhaps just as fully agreed, that this ought not to be the case, and that the effort should be, to free ourselves from this unscientific method as soon as possible. With all the gaps that exist in nature, there surely is no reason why, even though many genera must be very large, there should be the making of genera for accommodations sake. The basing of genera on comparative differences only, as is the case so largely in the *Rhopalocera*, the *Sphinges*, the *Deltoids*, and elsewhere, is only a confession of ignorance, and ought not to countenanced any longer. It may be well to try to map out in our divisions, the probable development of the past in nature, but in the *Lepidoptera*, this can, save in close allies, be only wildly guessed at. The history of nature in the *Lepidoptera*, since perhaps as far back as the Carboniferous age, has probably been downward in the main, not upward. The cataclysms of the past have broken the thread of kinship, beyond the possibility of recognition. And, (whatever our belief in evolution,) so far as history and experience go, nature is unchanging. It is wisdom we think, to map out as best we can, nature as we find it, and make divisions only as we find them in nature. Generic distinction should be based on structure only, and should extend till a break is found in nature. The genus *Papilio* is a case in point. Its species are very widely variant; but it is as impossible naturally to divide it, so far as present knowledge goes, as it is to divide nations naturally by parallels of latitude.

But what will constitute a natural distinction sufficiently marked to warrant a genus? Here is where the difficulty comes in. There is without doubt great loss, where genera are multiplied; there is hardly less loss, where they are too few. The middle path is, as in most cases, the safest. Let a genus have a good valid structural reason for existing, and let it be the duty of the one who affirms the need, to prove it, not the duty of the one who denies, to prove there is no valid ground for it.

On this basis, after thorough examination and study, though not without a consciousness, that in one case, much can properly be said against it, I have concluded to follow Mr. John B. Smith in his "Synopsis of the Noctuidæ of N. A.", Bull. Brooklyn Ento. Soc. Vol. V, July 1882, putting *Parthenos*, *Allotria*, and *Andrewsia*, under *Catocala*, as not

generically distinct. Notwithstanding the suggestion of so eminent an authority as Dr. Speyer, that *Messalina*, (*Belfragiana*) is generically distinct from *Catocala*, and notwithstanding on this suggestion, Mr. Grote created the genus *Andrewsia* for it, I fail to see any good reason why it should be separated even subgenerically. The only basis of separation so far known is the shape of the fore wings; but the difference is so slight, that I am confident no one could tell the denuded fore wing of the male, from that of any *Catocala* of like size. It may be, when the larva is discovered, that it may be so aberrant as to warrant generic separation but not until then. If the larva agrees with the general form of the larvæ of the *Catocalæ*, the insect can be nothing but a true *Catocala*.

With regard to *Elonympha* there is not the slightest ground for a separate generic reference. Guenee gives as his reasons for retaining Hubner's division "the color of the wings beneath, the palpi, and the fact that the larva is not furnished with lateral fringes." Of the palpi, in another place, he says, "palpi very ascending, arched, a little heavy, the second joint narrow, smoothly squammose, the third long, linear, sharp". The first point might serve for specific reference, never for generic: the second, concerning the palpi, has no standing whatever; after denuding and examining hundreds of palpi of different species, and making drawings of many with the camera, I am prepared to say the palpi do not differ from those of other *Catocalæ*, and in the points indicated are not more marked than some others (*amica*, *crataegi*, *præclara* etc.). With regard to the third point, the larval fringes, this is likely true of others of the smaller species, and even if true of this alone, would have no generic or subgeneric value. *Allotria* has no excuse for remaining as a genus.

With regard to *Nubilis*, there is, I freely admit, valid ground for a difference of opinion. The coloration of the hind wings, at once is a mark, but coloration has not necessarily even specific value. The wings are slightly more pointed, but in no other case is this thought to be of generic or subgeneric value. The body of the female is strongly keeled, but this is a character in less degree of other *Catocalæ*. The insect hibernates in the pupal state, and often goes beneath the ground to pupate, but in no other genus, is this thought worthy a moments notice, as a basis for even subgeneric separation. These all afford no ground for any separation; but there is a marked difference in the genitalia of the male, unknown heretofore however, which may be by some thought a valid basis for generic reference. But structural differences which are

sexual, should be very cautiously if ever allowed as a ground for generic separation. Differences, even greater, have not divided *Acronycta*, or other genera, and *nubilis* is not further removed from the normal form of *Catocala* in this respect, than is *Aholibah*, which no one would think of putting in another genus. *Nubilis* comes the nearest of the *Catocalae* to *Ophideres*; and were the tibiae not spinulated might be congeneric with it. After all, ornamentation is the chief reason for the genus. It was so with Hubner in the case of both *elonympha* and *Parthenos*. Were the markings of the underwings like the ordinary *Catocala*, no one would think of generic separation. On the above grounds, I have retained all these groups, under the one genus *Catocala*. If any one does not consider my reasons sufficient, he has simply to take my subgenera as genera, and in place of *Catocala* make the following genera, with their respective species, *Catocalirrhus*, (*Parthenos* is a genus of the *Rhopalocera*), *Catocala* and *Catabapta*.

HISTORY OF THE GENUS.

The fathers of our science, Linnaeus, Cramer, Drury, Abbott & Smith, described the species known to them under the names *Noctua* or *Phalæna*. In 1802 Schrank gave the name *Catocala*, to these insects which have so striking a similarity to each other in their gayly colored underwings. Afterwards Hubner, after his fashion, divided these insects into as many sections as he could find superficial differences in coloration upon which to base them. Although these undescribed divisions have by many been recognized elsewhere in the *Lepidoptera* as genera, the most of his divisions of *Catocala* have never had any recognition whatever, as here he did not have the luck to hit on real differences, of which he knew nothing. Of the lot, *Parthenos* and *Allotria* alone lived, Guenee accepting them for *nubilis* and *elonympha*. Since Guenee's time these have been recognized, without investigation, till in 1882, Mr. John B. Smith, the highest authority in America on the subject, again merged *Parthenos* and *Allotria* with *Catocala*, on the ground that no structural differences warranted their separate existence. In 1883, Mr. Grote, as has been already said, on the basis of a suggestion of Dr. Speyer, created the genus *Andrewsia* for *Messalina*. But, as has been shown, this has no reason whatever for existing.

LIMITATIONS OF THE SPECIES.

From what has already been said of the inconstancy of the ornamentation and coloration of the wings it need not now be said, there is room

for widely differing opinions concerning specific values. Some rules looking to determination can safely be kept in mind; first, that a species under differing conditions of food, temperature, and humidity, will show variations, and under these conditions, will breed true to the form thus necessitated; second, the existence of intergrades, properly proves specific identity; third, what is known to be true of one species, is a valid basis for determination concerning a kindred species. Under the first rule, we may legitimately expect the species west of the great plains to vary more than those east. It has been one of the marvels of Lepidopterology to me that just as soon as the Missouri River is reached, insects cease to vary, and every new form in that wonderful country must, by necessity, be judged a new species; while ordinarily with the humidity of Oregon, and the desert dryness of Arizona; the intense heat of the latter region, and the bitter cold of Montana; the high mountains of Colorado, Utah, and California, and the extreme depression of Southern California, it would seem constancy in the size and appearance of species would be impossible. The second rule is universal to all nature in its application, and it is the duty of those who claim intergrades are hybrids, to prove their claims. With regard to the third rule, we will explain; e. g. Prof. French has raised both forms of *amatrrix* from the eggs of the same female; then the presence, or absence of a basal, discal, or apical dash, or shading, is never to be taken as having specific value, till it is proved to have that value by breeding. Again, it is known, beyond doubt, that *Verrilliana* varies in the color of the hind wings, from bright red to clear yellow. Then a simple difference from red to yellow in the coloration of the hind wings does not in any case, till proved to do so, warrant specific separation. The same may be said of the color of the fringes, the ground color of the primaries, the shading within the t. p. line or along the inner margin. Whatever is known to be true of one species, must when a correspondence takes place, be considered true of any kindred species.

The first *catalogue* of the American *Catocalæ* which can be so called is that given by Hubner, Verz. pp. 276-78. Although making many divisions, to which he gives names, he begins with the black under wings and ends with the small yellow ones.

The first *synopsis* of the species of *Catocalæ* of N. A., was made, so far as I can learn by Guenee, in his Noctuelites, Vol. VII, pp. 79-107. He there collected the descriptions of the past, described new forms, and arranged them in a synopsis, with the *Catocalæ* of Europe. In his ar-

rangement, he places the red underwings first, then the white, then the black, then the large yellow, and finally the small yellow. He places *Parthenos* and *Allotria* before *Catocala*.

Walker in the Cat. Brit. Museum, Noctuelitæ 1193-1209, gives a synopsis of the American species by themselves. He follows the order of Guenee, and his list is incorporated by Morris in his Catalogue of the Noctuidæ of N. A.

In 1872, Mr. Grote published in the Trans. Amer. Ent. Soc. Vol. IV, pp. 1-20 a monograph of the genus *Catocala* and gave descriptions of all the species known to him. In this monograph he follows the order of the catalogue of Hubner. He gives as his reason for so doing (Can. Ent. IV, 164) "I inaugurate the genus with the black winged species from the consideration that such species are not found in other continents, and that in North America the genus attains its fullest representation. I allow them to precede the more typical specific forms such as certain of the red winged species and conclude with the yellow winged *Catocalæ*, as has been customary with regard to the European species."

In 1872, in his work "the Rhopalocera and Heterocera of N. A.", Mr. Strecker began to give descriptions, with colored figures of all the *Catocalæ*. The work follows no order whatever in the giving of the species, and, yet incomplete, has appeared only at irregular intervals; but it is the most notable addition to the literature of the genus which has ever appeared.

In 1875, Mr. Hy. Edwards issued in Proc. Ac. Sc. Cal., a monograph of the species of *Catocala* found on the Pacific Coast; and in the same publication, 1877, gave a new catalogue of the Pacific species.

Mr. Grote has published several catalogues of the species, the last appearing in 1882.

In 1880, the author of the present paper published Bull. Brooklyn Entom. Soc. a catalogue of the species. In this Mr. Grote's order of sequence was inverted, on the ground that the small yellow winged species seemed to follow naturally after *Syneda* and *Parthenos*, and the black ones ending the list, naturally led to *Spiloloma* and *Spintherops*. This catalogue was followed in a check-list, published by the Brooklyn Ent. Soc. in 1882.

In 1881 Prof. French issued for the use of pupils and students a "Synopsis of the *Catocalæ* of Illinois". In this, he follows the sequence established by Hubner and followed by Grote.

No attempt has been made, so far as I know, to bring together the descriptions of the larvæ of the various species. Abbott and Smith, and afterwards Guenee from unpublished drawings and notes by Abbott, gave the larvæ of various species, though the notes he made use of seem to have been regarded by Guenee as unreliable. Since then, detached descriptions have been given in the current periodicals. I have endeavored to gather all these below in their proper places.

In the determinations below I use the word *variety* to mean a local form, which breeds true to itself, but is yet known by intergrades, or breeding elsewhere, to be connected with the stem form of the species. E. g. *carissima* is in this sense, a variety of *cara*. Through the South, it continually breeds true to itself, as *cara* does northward; but there is a belt of territory where they intergrade.

I also give variety standing to marked accidental variations, which do not breed true to themselves, but which would not likely be easily referred to the stem form. E. g. *phalanga* is in this sense, a variety of *paleogama*. The more marked of the variations among the *Catocalæ*, though most not so marked as to be worthy varietal standing, have been named, and will be referred to in their places.

My hearty thanks are due, and are hereby given to Dr. Bailey, Messrs. Hy. Edwards, Neumoegen, Strecker, Tepper, and the American Ent Soc. for the examination of types. And to these, and many others for the examination and use of material and for assistance. And especially to Mr. John B. Smith, my very kind friend, for his constant encouragement, and his very many and helpful suggestions as to methods and lines of study, as also for his valuable work on the accompanying plate.

After some thought, I still persist in my opinion that the small yellow underwings should be catalogued first. It is true the claws would seem to demand they should be placed lowest in the list but *Syneda* must it seems to me precede *Catocala*, and these are altogether most closely allied to *Syneda* and its allies.

SYNOPSIS OF SPECIES.

- I. Middle tibiæ only, spinulated. I—22
 II. Middle and hind tibiæ spinulated. 23—60
 III. All tibiæ spinulated. 61—84

1. *Secondaries yellow.*

A. Median band wanting on secondaries.

- 1 Marginal band reaching inner margin 2 *elonympha*. -
 2 Marginal band not reaching inner margin. 4 *amica*. -

B. Median band present.

- 3 Primaries yellowish at base; black between b. and t.a. line; median space yellowish; t.p. line distinct; s.t. space white near costa; s.t. line black, distinct, serrate. 6 *minuta*. -
 4 Primaries light gray with greenish sheen; basal dash present; veins near apex lined with black; median band not reaching inner margin 9 *præclara*. -
 5 Primaries light gray; t.a. and t.p. lines nearly or quite coalescing near inner margin, and indistinct near middle; t.p. line edged outwardly with ferruginous especially at bend near inner margin. 8 *grynea*. -
 6 Primaries with large dark brown spot on median space along inner margin 7 *Olivia*. -
 7 Primaries reddish brown; t.p. line distinct, strongly angulated; bend near inner margin slight; secondaries with median band strongly angulated near inner margin. 10 *micronympha*. -
 8 Primaries dark gray with reddish; M of t.p. line with only the upper tooth; behind this the line almost straight to inner margin; secondaries with median band not reaching inner margin; outer band broken 11 *similis*. -
 9 Primaries uniform dark gray without reddish; ordinary lines indistinct; secondaries median band narrow strongly rectangular 12 *chelidonia*. -
 10 Primaries with median space white, blurred; lines almost obsolete; t.p. line edged outwardly with ferruginous; s.t. space and line distinct. 13 *Amasia*. -
 11 Primaries white; lines waved, very sharply distinct. 14 *sancta*. -
 12 Primaries pale greenish gray; basal space dark; median light; basal dash present; secondaries with median band heavy returning to base. 15 *dulciola*. -
 13 Primaries with lines heavy; M of t.p. line very much produced; t.a. and t.p. lines quite widely separated at inner margin; basal space and inner margin very dark. 16 *cratægi*. -
 14 Primaries as above, but ferruginous at base and beyond t.p. line; t.a. and t.p. lines nearly or quite coalescing near inner margin. 17 *blandula*. -
 15 Primaries reddish brown above; t.a. and t.p. lines approximating near inner margin. 18 *mira*. -
 16 Primaries smooth light gray; lines all clear; basal and slight apical dash; t.p. line at bend near inner margin returning to beneath bend; secondaries with median band not reaching inner margin; fringe clear yellow, black at end of veins. 23 *verrilliana* var. *votiva*. -

2. Secondaries red.

a. Median band of secondaries not reaching inner margin.

- 17 Primaries light ashen above, red beneath; median band middling broad 28 *verrilliana*. ✓
 18 Primaries nearly black with broad longitudinal olivaceous median band; red beneath; median band of secondaries very narrow 29 *ultronia* var. *Celia*. ✓
 19 Primaries white beneath 43 *Briseis* vars. *semirelict*a and *grotiana*. ✓

b. Median band of secondaries reaching inner margin.

- 20 Primaries white beneath 43 *Briseis*. ✓
 21 Primaries white beneath between the two black bands; red otherwise... 29 *ultronia*. ✓
 22 Primaries red beneath 30 *coccinata*. ✓

1. Hind tibiae spined between the two pairs of spurs only.

A. Secondaries yellow.

- 23 Median band present 3 *Messalina*. ✓
 Median band wanting.
 24 Size small; primaries with close smooth vestiture; lines almost obsolete; basal dash wanting; reniform black, pyriform 20 *nuptialis*. ✓
 25 Reniform annulate 19 *abbreviatella*. ✓
 26 Size medium; lines distinct; color uniform light gray 21 *Clintonii*. ✓
 27 Size medium; t.a. line heavily shaded on costal half; reniform and t.p. line also shaded at costa 24 *Amestris*. ✓
 28 Size large; primaries light bluish gray; lines distinct. M of t.p. line strongly produced; secondaries with median band curved even on both sides 34 *parta* var. *petulans*. ✓
 29 Primaries, yellowish brown, squamose, lines strong; secondaries with median band irregular and marginal band broken 31 *Ilia* var. *osculata*. ✓
 30 Secondaries with median band outwardly even, within continuing dark to base 27 *cerogama*. ✓
 31 Secondaries with two median bands; claws bifid 1 *nubilis*. ✓

B. Secondaries red.

a. Third joint of palpus normal in length.

- 32 Size very large; primaries with black shade from costa over reniform to beneath apex; subreniform russet; vestiture squamose, no basal dash 33 *marmorata*. ✓
 33 Size large; primaries smooth bluish gray, apical and basal dashes present; M of t.p. line prominent; secondaries dull red 34 *parta*. ✓
 34 Primaries white, heavily covered with black atoms and shadings; very squamose; no apical or basal dash; subterminal space white, distinct, serrate 35 *unijuga*. ✓
 35 Lightly powdered with black; subterminal space white, serrate; subterminal line distinct; median band short 36 *pura*. ✓
 36 Primaries more bluish with russet at t.a. and t.p. lines and at reniform 37 *Stretchii*. ✓

- 37 Primaries of *Faustina*; secondaries of *Stretchii*. 38 *Rosalinda*. -
 38 Primaries close, even light gray; s.t. space bluish; secondaries in 6 following species bright red, median band short, somewhat broad. 39 *Faustina*. -
 39 Primaries squammosa; cream gray instead of bluish; subterminal space white. 40 *verecunda*. -
 40 Primaries light gray heavily lined and powdered with black; reniform black, subreniform white, terminal dots and s.t. dots suffused together. 41 *allusa*. -
 41 Primaries very light bluish gray, heavily powdered with black atoms; lines heavily lined with black. 44 *Hermia*. -
 42 Primaries dark ashen, unicolorous, lines indistinct. 42 *Mariana*. -
 43 Primaries very dark brown and black, often reddish; s.t. space clear, strongly serrate. 45 *electilis*. -
 44 Primaries uniform light brown, lines distinct, reniform strongly lined or clouded with black, often quadrate. 46 *Luciana*. -

b. *Third joint of palpus very short, size large to very large.*

- 45 Primaries rich dark brown; secondaries bright rosy red. 48 *cara*. -
 46 Primaries light brown, lines distinct; secondaries with discal spot below, also red at inner margin, but not covering half the wing. 49 *amatrix*. -
 47 Primaries gray or cream brown, lines often indistinct, secondaries with median band narrow lengthened, below, red along inner margin, the red covering more than half the wing. 50 *junctura*. -
 48 Primaries rich maroon brown, secondaries somewhat brighter red than *junctura*. 51 *babayaga*. -
 49 c. *Secondaries orange red*. 51 *Ilia*. -
 50 d. *Secondaries black*. 53 *tristis*. -

2. *Hind tibiae spined between and above the two pair of spurs.*

A. Less than 5 spines above.

a. *Secondaries yellow.*

- 51 Small, primaries white beneath, between the two black bands. 5 *gracilis*. -
 Medium size, yellow beneath.
 52 Primaries very light gray, lines light, indistinct. 22 *Frederici*. -
 53 Primaries dark gray, lines very heavy, median band of secondaries very irregular, marginal band with three large scallops within. 25 *consors*. -
 54 Primaries yellowish or reddish brown, lines distinct; median band of secondaries with angle near inner margin, fringes yellow. 26 *Delilah*. -
 55 Primaries even gray; secondaries with outer yellow space even on both sides. 47 *concumbens* var. *Hillii*. -

b. *Secondaries rosy red.*

- 56 Primaries light even gray. 47 *concumbens*. -
 57 c. *Secondaries black with white median band*. 52 *relicta*. -

B. More than 5 spines above.

- 58 Secondaries bright yellow. 23 *illecta*. -
 59 Secondaries violet red. 32 *Aholibah*. -
 60 Secondaries black. 54 *Epione*. -

1. Secondaries yellow.

- 61 Primaries black.....55 *antinymphe*. ✓
 62 Primaries unicolorous smoky gray; lines light but distinct; secondaries with yellow band narrow; base dark.....56 *serena*. ✓
 63 Basal and median spaces unicolorous reddish brown or blackish; outer space lighter, unicolorous.....57 *badia*. ✓
 64 Primaries rich reddish brown; secondaries with median band and margin broad58 *muliercula*. ✓
 65 Primaries light clear gray; lines light but distinct.....59 *habilis*. ✓
 66 Primaries blue gray, sprinkled with black; t.p. line edged outwardly with russet; subterminal black band distinct.....61 *paleogama*. ✓
 67 Large; primaries smooth even; dull or bright light gray with considerable russet; M of t.p. line strongly produced.....62 *neogama*. ✓
 68 Very large; like *neogama* but with some squammoseness and with lines more spreading.....63 *subnata*. ✓
 69 Primaries dark brown; lines distinct; M of t.p. line produced; beneath with margin and fringes dirty white.....64 *piatrix*. ✓
 70 Primaries with costal half of basal space very dark, the rest of the wing light fawn or olive with reddish brown; beneath outer border and fringes yellow.....65 *nebulosa*. ✓
 71 Secondaries orange red.....60 *innubens*. ✓

2. Secondaries black.

- 72 Small; smooth light gray; lines indistinct.....66 *Judith*. ✓
 73 Medium size; primaries blue gray, narrower than ordinary; no basal dash; fringes of secondaries white.....68 *dejecta*. ✓
 74 Primaries light gray with just a shading of blue; reniform light russet within also russet beyond t.p. line; basal and often apical dashes present; fringes pure white.....69 *retracta*. ✓
 75 Larger; primaries light gray with a general ferruginous shading, fringes dirty white.....70 *luctuosa*. ✓
 76 Large; primaries light bright gray, basal dash present; t.a. line heavy on costal half; shading from costa across reniform to below apex; t.p. line clear, heavily marked; faint indication of white median band on anterior margin of secondaries; fringe pure white.....71 *vidua*. ✓
 77 Very large; light squammose gray, no basal dash, reniform russety, russet band beyond t.p. line, heavy black dash from costa over reniform below apex.....72 *mæstosa*. ✓
 78 Large; primaries dark gray with blackish shading; heavily powdered with black, fringes white, black at end of veins.....73 *lacrymosa*. ✓
 79 Primaries white, reniform black.....74 *Sappho*. ✓
 80 Primaries dark dusky brown with russet shading; lines indistinct; fringe whitish, black at end of veins.....75 *Agrippina*. ✓
 81 Primaries smooth light even gray; lines light but distinct.....67 *Robinsonii*. ✓
 82 Primaries with inner margin dark, basal dash present, parallel on anterior part with inner margin; one white band beneath fore wings.....76 *insolabilis*. ✓
 83 Primaries not black along inner margin; basal dash when present running outward towards middle of outer margin; two white bands beneath.....77 *Angusi*. ✓
 84 Primaries uniform smoky or dark gray; subterminal space lighter; M of t.p. line with lower tooth much the smaller.....78 *obscura*. ✓

CATOCALA, *Schränk*, (*cat-O-cal-a*).

(Kata beneath, kalos beautiful.)

Parthenos, Hub. Verz. p. 278, Guen. Noct. 3, 79, *Catocalirrhus*, Andrews, C.E. 9, 20, *Allotria*, Hub. Verz. p. 280, Guen. Noct. 3, 36, *Andrewsia*, Grt. List 1883, p. 41, *Ephesia*, Hub. Verz. p. 278, *Corisce*, Hub. Verz. p. 278, *Eucora*, Hub. Verz. p. 278, *Asilotes*, Hub. Verz. p. 277, *Eunetes*, Hub. Verz. p. 276, *Lamprosia*, Hub. Verz. p. 277, *Mormonia*, Hub. Verz. p. 276.

§ **CATOCALIRRHUS**, *Andrews*.

1. **nubilis**, Hub. (*Parthenos*) Samml. 2, f. 3, Verz. 2737, Guen. Noct. 3, 80, Walk. C.B.M. 1179. Head rather small, thorax dark ashen, a black line in front, strongly tufted behind; abdomen dark gray above, lighter below, strongly keeled dorsally; fore wings pointed, deeply scalloped outwardly, much rounded, color dark ashen; basal and t.a. lines distinct, geminate; t.p. line obsolete; beyond a submarginal line, slender, much angulated; a blackish, somewhat triangular apical dash present; reniform large, bounded on either side by a light band, starting from costa, the outer reaching to outer third, the inner parallel, reaching to inner margin; these are often nearly white, and coalesce behind reniform; subreniform obsolete; hind wings bright yellow, with two median black bands, irregular, parallel; discal lunule within strongly marked, marginal band toothed both sides, fringe yellowish. Expands 50-70 mm. Found throughout the East and Colorado.

Of the *larva*, I have seen no description. I have often found it, but can say no more than that it is dark brown, *Catocala* like in general appearance. It pupates beneath, or just at the surface of the ground. Food, the common locust (*Robinia pseudacacia*).

§§ **CATOCALA**, *Schränk*.

2. **elonympha**, Hub. (*Allotria*) Hub. Zutr. 29, 30, Verz. 2748, Guen. Noct. 3, 1369, pl. 15, f. 11.

Thorax light gray, with tinge of yellowish; abdomen with yellowish more marked; primaries with lines distinct, basal space dark, beyond t.a. line light gray often almost white to reniform, beyond dark gray; reniform distinct, subreniform obsolete, M of t.p. line hardly suggested, s.t. white line distinct, secondaries rather dull yellow, median band wanting, marginal band broad, indistinct, but even on inner margin, extending to anal margin. Beneath, wings dull, indistinct, yellowish, primaries with reniform black, beyond an even, narrow, curved black line, also a broad marginal line; secondaries with discal spot, and 3 even curved bands, 2 inner and narrow, 1 marginal and broad. Expands 40-45 mm. Habitat East and South.

The *larva* according to Guenee as based on drawing of Abbott is gray white, with a roseate tint; without fringes; variously marked with brown, and with a substigmatal brown line; the back of the larva remains hunched in repose. It feeds some say on Walnut, others on a species of *Glycine*.

3. *Messalina*, Guen. Noct. 3, p. 107, Walk. C.B.M. 1209, *Belfragiana*, Harv. Buf. Bul. 2, 281, *Jocasta*, Strk. Rho. & Het. p. 107, Grt. Trans. A. Ent. Soc. 4, 19.

Primaries of an even violaceous gray, with all the anterior half lightened with pale gray upon which scarcely traces of the two lines show themselves; these are flexuous, not angulated, nearly parallel, and very approximate posteriorly, and to the reniform which nearly reaches the bend of the t.p. line; secondaries of a pale ochre yellow, base a little dusky, without median band, but with a wide marginal band continued to both borders, and having a single sinus not far from anal angle; beneath paler, with traces of a median band; abdomen slender, acute, brown beneath; thorax gray, with a brown collar. Expands 50—55 mm. Habitat Kansas to Texas.

Mr. Chas. Oberthür, of Rennes, France, to whom Guenee's types came, informs me that when they came into his possession, all were found to be destroyed beyond the possibility of recovery by the larvæ of *Anthrenus*. So no identification can be made of any of Guenee's American species described from imagines, from the types themselves. All have however heretofore been identified except *Messalina* and *micronympha*. He gives a figure of *polygama*, which easily shows it has heretofore been incorrectly identified. *Connubialis* heretofore not identified, was described from a colored drawing of Abbott which is now, I understand, in the British Museum. There is no doubt in my mind that the above identification of *Messalina* is correct. We have no other species without median band in America, except *elonympha* and *amica*, both of which Guenee knew. And the rest of the description is always at least fairly accurate, except that Guenee states that the marginal band reaches the anal border. Mr. A. G. Butler first called my attention to the fact that this is often the case in Kansas specimens.

4. *Amica*, Hub. (Am-I-ca), *Corisce amica*, Hub. Zutr. 57, 58, *Androphila*, Guen. Noct. 3, 106, Grote, Trans. Am. Ent. Soc. 4, 18, *Lineella*, Grt. Trans. Am. Ent. Soc. 4, 18.

Primaries pale gray, the lines fine, not very evident, the t.a. line the more heavily marked; a dark shade running from costa through reniform to below apex; slightly brown beyond reniform; t.p. line dentate, with M not prominent; subreniform indistinct; s.t. space whitish, serrated; secondaries bright yellow, varying to pale yellow, without black median band; marginal band broad, broken near anal angle, with black dot beyond marking its continuance, or without this. Beneath on hind wings the median band is evidenced. Expands 40—45 mm. Habitat East and South.

Appears very early in the season. *Lineella*. Grt., differs from the typical form in being somewhat darker, and lacking the apical dash.

Var. *Nerissa*, Hy. Edw., Bull. B'klyn. Ento. Soc. 3, 61.

This variety from Texas, has the fore wings very dark, almost black.

Larva, Guen. Noct. 3, 106. Coquillett Papilio 1, 7. Body greenish gray or yellow; a light dorsal, a dark sub dorsal, and a dark broken stigmatal stripe; the two anterior pairs of abdominal legs partially aborted. On the 8th segment is a protuberance, and in Abbott's specimen, described by Guenee, another sharper and turned backwards on the 11th. Head gray, with two white spots. Length 1.25 inches. Food plant Oak.

The descriptions above referred to very materially differ.

5. *gracilis*, Edw. Trans. Am. Ent. Soc. 2, 511, Grote l.c. 4, 17, Grote Can. Ent. 6, 169.

Primaries light gray, more or less clouded with blackish on the outer and inner margins; transverse lines indistinct; t.p. line edged outwardly with brown; s.t. space clear gray; reniform gray, with a brown ring; secondaries deep yellow, band narrow, curved, terminating abruptly at some distance from the inner margin; border broad, interrupted, with spot near the angle. Expands 45 mm. Habitat South and East.

Var. *sordida*, Grt. Can. Ent. 9, 170. Dark hoary suffused blue gray, without basal streak on secondaries.

6. *minuta*, Ed. Trans. Am. Ent. Soc. 2, 512, Grote l.c. 4, 17.

Primaries dark glossy brown; transverse lines distinct; b. line sharply toothed; t.a. line arched; median band generally narrow, connecting with shade along inner margin; border interrupted but with anal spot. Expanse 40—50 mm. Eastern and Middle States. Food plant, Locust. A variable species, the variations differing very much in general appearance from each other.

Var. *parvula*, Edw. Trans. Am. Ent. Soc. 2, 511, Grote, Trans. Am. Ent. Soc. 4, 17. Primaries light brown; inner margin black.

Var. *mellitula*, Hulst. Base and median space olivaceous, with a brownish shade; reniform obsolete; subreniform annulate; space from b. line t.a. line jet black; subterminal space near costa, white; outer third darker than median space.

7. *Olivia*, Hy. Edw. Bull. Brookl. Ent. Soc., p. 295.

Size of *grynea*; primaries olivaceous; on the internal margin, and running nearly to the middle of the wing, covering the space of the subreniform spot, is a large sub-oblong brown patch, narrowest anteriorly, not reaching the base of the wing, and toothed posteriorly; basal line indistinct; t.a. line quite distinct; t.p. line obsolete, save at costa, reniform faintly defined; secondaries orange yellow; the median band is rather narrow, constricted in the middle, and joined to a black clouded streak, which runs along the abdominal margin to the base; marginal band interrupted. Thorax olivaceous, abdomen orange brown, darkest posteriorly, with a small longitudinal white spot at base. Marginal band beneath, continuous. Expands 45—50 mm. Habitat Texas.

Very rare. Has the appearance of being an aberration.

8. *Grynea*, Cram. (gryn-E-a) *Phalaena grynea*, Pap. Exot. 3, 29, pl. 208, f. H, *Ephesia grynea*, Hub. Verz. 2732, *Noctua grinea*, Oliv. Ency. Meth. 292, 206, *C. polygama*, Guen. Noct. 7, 105, pl. 16, f. 2, (?), *nuptula*, Walk. C. B. M. 1205, *grynea*, Grt. Trans. Am. Ent. Soc. 4, 16.

Primaries pale smooth and close dull glaucous gray; all the lines often obsolete, save at costa; sinus of t.p. line very deep, the line closely approaching the t.a. line at inner margin; t.p. line outwardly, and behind sinus strongly marked with ferruginous, as are the costal dots; secondaries deep yellow, median band angulated, recurrent to base; border broken or not. Expands 45—55 mm. East and South.

The description of *polygama*, Guen., seems to fit this species; the figure, which is poor, seems more like var. *Alabamæ*; neither description nor figure approach the insect identified as *polygama* by Grote.

Var. *Alabamæ*, Grt. Proc. Acad. Sci. Phil. 1875, 427.

Primaries wanting the ferruginous shadings. After examination of type, and other specimens, I have no doubt of the correctness of this reference.

Aber. *constans*, Hulst. Grote, Can. Ent. 13, 35. Secondaries black, except a yellow spot at base, and two others near middle of wing.

Larva: Koebele, Bull. Brookl. Ent. Soc. 4, 22, Coquillett, Ills. Rep. 10, 184. Head dark with two whitish lunules near summit; these edged behind with reddish; body silver gray, with reddish shading, the latter more marked near head; a prominent rust red protuberance on 11th segment; summit of legs red. Food plant Apple and Plum.

9. *præclara*, Grt. & Rob. Proc. Ento. Soc. Phil. vol. 6, plate 4, f. 4.

The size of and much like *grynea*, but primaries with lines distinct, with less ferruginous, t.p. line with stronger M, and smaller sinus, and the general color with a greenish sheen; veins lined with black near apex. Secondaries with marginal band broken. Found Eastward.

✓ 10. *micronympha*, Guen. Noct. 3, 102, Walk. C.B.M. 1204, Grote, Trans. Am. Ent. Soc. 4, 15, *fratercula*, Grt. & Rob., Proc. Ent. Soc. Phil. 6, 24, pl. 4, f. 3, Trans. Am. Ento. Soc. 4, 17, Streck. Rho. Het. p. 37, pl. 5, f. 8. *Atarah*, Streck. Rho. Het. p. 97, pl. 11, f. 10, 11.

Primaries chestnut brown, varied with whitish gray and blackish; median lines distinct, nearing below; M of t.p. line strong, the inferior tooth smaller, sinus very small; a black dash from costa, covering reniform, and reaching to below apex; s.t. line whitish, undulate, nearly perpendicular; secondaries ochrey yellow, median band narrow, angulated, returning to base along margin; border broken. Expands 40 to 55 mm.

An extraordinarily variable species. *Atarah* is slightly lighter than type form.

Var. *Jaquenetta*, Hy. Edw. Bull. Brookl. Ento. Soc. 3, 60. Primaries olivaceous, lines indistinct; a dark shading towards apex.

Var. *Timandra*, Hy. Edw. Bull. Brookl. Ento. Soc. 3, 60. Primaries sordid white, lines distinct; secondaries with median band narrow.

Var. **Hero**, Hy. Edw. MSS. Primaries with large white spot at base.

Var. **Gisela**, Meyer (Gis-E-la). Bull. Brookl. Ento. Soc. 2, 96. Primaries black to t.p. line.

Larva; Coquillett, Papilio 1, 7. Head light gray, bordered above and on sides with black; body ashen gray; the dorsal space dark gray, bordered outwardly with a row of piliferous spots; a stigmatal row of black spots also; there is a slight prominence on 8th segment; the two anterior pair of abdominal legs smaller than the others, in specimens brought by Mr. Koebele from Florida, almost obsolete. Length nearly 2 inches; food plant, Live and Burr Oak.

11. **similis**, Edw. Proc. Ent. Soc. Phil. 2, 511, Grote, Papilio, 1, 159, Can. Ent. 9, 169, *amasia*, Ab. & Sm. Lept. Ga., 2, 179, pl. 90 lower figure, Guen. Noct. 3, 103, *formula*, G. & R. Proc. Ent. Soc. Phil. 6, 27, pl. 1, f. 3.

Primaries gray, clouded with brown and black; lines distinct; t.a. line edged inwardly, t.p. line outwardly with brown; t.p. line angulated with one angle beyond reniform in place of M, then nearly straight to sinus, which is very small; reniform pyriform light; subreniform annulate; triangular light patch at apex, along costa; secondaries bright yellow; median band curved, nearly even, short; border broken. Expands 45—55 mm. Found East and South. Food plant, Oak.

Var. **Aholah**, Streck. Rho. Het. p. 96, p^l. 11, f. 8.

Primaries clear silver gray, with large black patch beyond reniform extending to apex.

Var. **Isabella**, Hy. Ed. Bull. Brookl. Ento. Soc. 3, 60.

Primaries sordid white; lines distinct; t.p. line edged with cinnamon brown.

Larva probably nearly the same as in *amasia*, thus deceiving Abbott in the identity of the two species. His figure makes it greenish gray, with protuberances on each segment, and with dorsal, subdorsal and stigmatal dark lines; also an oblique dark line on each segment.

12. **chelidonia**, Grt. Papilio 1, 159, Ill. Essay 67, pl. 4, f. 41.

Primaries even dark fuscous gray, somewhat hoary; reniform shaded with gray; subreniform stained with brown; lines indistinct, with course of *similis*; secondaries like *similis*, but with median band generally narrower. Probably representing *similis* in Arizona. Expands 40—50 mm. Found in Arizona. Food plant, Scrub Oak, (auct. Doll).

13. **amasia**, Ab. & Sm. *Phalaena amasia*, Lep. Ga. 2, 179, pl. 90, upper fig. *Noctua amasia*, Oliv. Ency. Meth. 8, 290, 200, *Cat. amasia*, West. Nat. Lib. 37, 205, pl. 26, f. 3, Walk. C.B.M. 1204, Grt. Trans. Am. Ent. Soc. 4, 16, *Cordelia*, Hy. Edw. Bull. Brookl. Ento. Soc. 3, 59.

Primaries sordid white; basal half line very distinct; t.a. and t.p. lines nearly obsolete, the latter when evident, scalloped, not angulated; median space sordid white; reniform blackish; t.p. line edged outwardly with cinnamon brown; subterminal line

evenly, dentate; secondaries yellow; median band often hooked; border generally interrupted. Expands 50—55 mm. Habitat East and South East. Food plant, Pride of India or Oak. *Larva* probably as that of *similis* q. v.

14. *sancta*, Hulst, *connubialis*, Guen. Noct. 3, 103, *amasia*, Streck. Rho. Het. 77, pl. 9, f. 12.

Primaries clearer white than *amasia*, lines all strongly distinct, waved not angulated; t.p. lined edged outwardly with reddish; secondaries as in *amasia*. Expands 50—55 mm. East and South East.

These last two species have been much confused. Abbott's upper figure, from which Smith says his description was made, is undoubtedly the insect afterwards named *Cordelia* by Hy. Edwards. Guenee describes the lower figure of Abbott as *amasia*; but Abbott's description of the upper figure, holds good against that of Guenee. Mr. Grote identified the more southern form as *amasia*, and thus it is generally labelled in collections. Mr. A. G. Butler writes me, this latter is *connubialis*, Guen.: but the description does not fit, and it was described from a drawing, and so the name does not in any case hold.

15. *dulciola*, Grt. (dul-CI-o-la), Papilio 1, 5.

Primaries pale greenish gray, lighter to t.a. line; t.a. line heavy, evenly curved; t.p. line fine; terminal space a little darker; secondaries dark yellow, with wide black median band connected with base. Expands 50 mm. Taken in Ohio, and I have been told in Ills.

It appears very early in the season, as early as the 1st of June.

16. *cratægi*, Saun. Can. Ent. 8, 72, *pretiosa*, Lint. Can. Ent. 8, 121.

Primaries sordid white, lines distinct; basal space reddish or blackish, subterminal space some darker than median; much darker along inner margin; t.p. line with lower tooth of M small; a heavy dark shading from M of t.p. line to below apex; little or no reddish beyond t.p. line; secondaries deep yellow; median band heavy, returning to base; margin generally slightly interrupted. Expands 40—50 mm. Habitat N.E. U.S. and northward.

Larva; Saun. l. c. p. 72. Greenish ash color varying considerably; protuberances on each segment generally tipped with red; a marked protuberance on 8th segment dorsally, dull red in color; fringes rosy. Feeds on *Cratægus*.

Pretiosa I am unable to separate from *cratægi*. It has b, space black, the lines not coalescing near inner margin.

17. *blandula*, Hulst, *polygama*, Grt. nec. Guen. Trans. Am. Ent. Soc. 4, 15.

Same as *cratægi* except that on primaries the base is always reddish; the M of t.p. line with teeth nearly equal; the t.a. and t.p. line coalescing posteriorly, and the t.p. line edged outwardly with reddish; also somewhat larger.

Larva; Reed, Can. Ent. 2, 30, Saun, l.c. 8, 72. Like the larva of *cratægi*, but without the prominence to the protuberance on 8th segment, and with one on the 11th. Mr. Reed's description may be the larva of *cratægi*. Feeds on *cratægus*.

I feel strongly confident that *cratagi* and *blandula* are one species, notwithstanding the larval differences.

With regard to *polygama*, Guen., a glance at his figure Noct. 3, pl. 16, f. 2. will convince any one that this species could not have been intended. The primaries and secondaries are entirely different. The description accords with *grynea*, and the figure fits it as well as any species known to me. Moreover, Guenee in his synopsis, does not mention *grynea*, so it as such must have been unknown to him.

18. *mira*, Grt. Can. Ent. 8, 230; Noct. N.A. p. 70, pl. 4, f. 43.

General markings as in *blandula*, but with the whole upper surface marked with rich chestnut brown. Expands 50—56 mm. Habitat, Florida to Kansas and southward.

19. *abbreviatella*, Grt. Trans. Am. Ento. Soc. 4, 14, Noct. N.A. 66, pl. 4, f. 40. Angus, Papilio 4, 37.

Primaries smooth pale gray, darker terminally; t.a. line broad, black from costa $\frac{2}{3}$ across wing, then obsolete; reniform annulate, black inferiorly; subreniform faint, black on inner margin; t.p. line faint or obsolete, not strongly angulated; secondaries bright yellow; median band short, curved, of nearly even width; border generally broken. Expands 45—50 mm. Habitat Minn., Southward, and East to Ills.

Var. *Whitneyi*, Dodge, Can. Ent. 6, 125.

Primaries generally a brighter gray; t.a. line broadening inferiorly, before becoming obsolete, forming a triangular patch; reniform heavily black; border of secondaries generally unbroken.

20. *nuptialis*, Walk. C.B.M. 1206, Grt. Trans. Am. Ent. Soc. 4, 14, Buf. Bull. 2, 222, Angus, Papilio 4, 37, *Myrrha*, Streck. Rho. Het. p. 97, pl. 11, f. 12.

Primaries above, pale gray of *abbreviatella*, outwardly darker; all lines indistinct or generally obsolete; reniform black, subpyriform; secondaries a deeper yellow; otherwise as in *Whitneyi*. Expands 50—55 mm. Habitat Nebraska to Texas.

I feel entirely confident that *abbreviatella* will finally be determined as one with this species; but in the present status of the case I hesitate so to refer it.

21. *Clintonii*, Grt. Am. Ent. Soc. Phil. 3, 89, pl. 3, f. 4, Streck. Rho. Het. 35, pl. 5, f. 6, *Helene*, Pilate Pap. 2, 31.

Primaries pale smooth uniform gray; lines fine, but quite distinct. M of t.p. line generally pronounced; basal dash generally present, also black dash at sinus of t.p. line; veins black, subterminally; slight apical clouding; secondaries clear yellow; median band generally constricted near middle, not reaching inner margin; marginal band generally broken. Expands 55—60 mm. Habitat, East of the Mississippi.

Helene is somewhat darker than the type form, and varies in some minor details. The name can not stand however, as there is a *C. Helena* from Siberia.

22. **Frederici**, Grt. Trans. Am. Ent. Soc. 4, 14, Buf. Bull. 3, 217, Ill. Essay 70, pl. 4, f. 44, Can. Ent. 9, 168.

Primaries with obliterate markings, somewhat dark olivaceous, but overlaid with pale scales through which the lines are faintly evident; all the lines olivaceous blackish, t.a. line widely geminate, ordinary spots obsolete, t.p. line even, regularly scalloped; secondaries largely clear bright yellow, median band narrow, shortened, marginal band narrow, yellow outwardly, especially at apex. Expands 50—60 mm. Habitat, Texas.

23. **illecta**, Walk. C.B.M. 1205, Grote, Trans. Am. Ent. Soc. 4, 13, Can. Ent. 6, 199, *Magdalena*, Streck. Rho. Het. 93, pl. 11, f. 9.

Primaries pale even gray lightly shaded, lines fine and black, reniform small, t.p. line acutely dentate, the lower tooth much the smaller, in general the appearance of primaries of *concupens*. Secondaries bright yellow, median band narrow, not reaching the inner margin, marginal band broken. Expands 60—70 mm. Habitat, Ills. and Neb. to Texas.

24. **Amestris**, Streck. Rho. Het. 96, pl. 11, f. 6, Hulst. Bull. Brookl. Ento. Soc. 3, 8, *Papilio* 1, 215, *Anna*, Grt. Trans. Am. Ent. Soc. Sept. 1874, Buf. Bull. 2, 222, *Papilio* 1, 161, *Westcottii*, Grt. Can. Ent. 10, 195.

Primaries ashen; t.a. line double, and from middle to costa very heavy, forming a diagonal black bar, t.p. line fine, but distinct, heavily edged near costa with black, reniform dark, heavily clouded. Secondaries bright yellow, median band narrow, not reaching the inner margin, marginal band broken. Expands 50—55 mm. Habitat, Neb. and Ills. to Texas. *Westcottii* has an unbroken marginal band.

The name of this, and of two other disputed species was settled beyond reasonable question by the letter of Mr. Chas. A. Blake, *Papilio* 1, 216.

25. **consors**, Abb. & Sm. *Phalaena consors*, Lep. Ga. 2, 177, pl. 89, Oliv. Ency. Meth. 8, 290, 197, Guen. Noct. 3, 99, Walk. C.B.M. 1204, Grote, Trans. Am. Ent. Soc. 4, 11, Streck. Rho. Het. 95, pl. 11, f. 3.

Primaries dark ashen, pulverulent, concolorous, lines black, very heavy, t.p. line with one large tooth, reniform large, black, with brown annulus within, subreniform small, lighter, heavily annulate with black, a brown band beyond t.p. line, then light gray. Secondaries bright deep yellow, twice constricted, yellow interspace narrow, sinuous. Expands 75—80 mm. Habitat, Penn. to the Mississippi and Southward.

Larva, Abb. & Sm. Lep. Ga. pl. 89, Guen. Noct. 3, 99. Larva elongated, of a clear ochrey gray color, without protuberances, clouded with blackish, with the side and joints reddish; head concolorous, with two black streaks. Food plant Myrtle (*Myrica*), and Bastard Indigo.

26. *Delilah*, Streck. (DEL-i-lah), Rho. Het. 96, pl. 11, f. 7, Hulst. Bull. Brookl. Ent. Soc. 3, 8, Papilio, 1, 215, *adoptiva*, Grt. Trans. Am. Ent. Soc. Sept. 1874, Papilio 1, 161.

Primaries rich velvety yellow brown; basal dash present, t.a. line very heavy and dark, t.p. line dark and distinct, teeth prominent and broad, s.t. space somewhat lighter, s.t. line fine, strongly dentate. Secondaries bright yellow, median band rather narrow, generally rectangular at bend towards inner margin; marginal band broad, broken or unbroken. Expands 70—80 mm. Habitat, Neb. to Ills. and Southward, west to Arizona. Food plant Oak.

Var. *Desdemona*, Hy. Edw. Papilio 2, 15. Wood brown with lighter shades, reniform brown, subreniform lighter. Secondaries rich orange. Ariz. Food plant, Scrub Oak. (Doll.)

Var. *Calphurnia*, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 59. Primaries with a greenish tint, lines faint. Secondaries wholly black, with the exception of a central cloud, a broad marginal band, and a central narrow band which are orange.

This species is, considering the numbers collected, a very variable one in both the primaries and secondaries. It shows well a tendency, common to all the *Catocalæ*, that as the median band narrows, it becomes rectangular at the bend near anal margin.

27 *cerogama*, Guen. (cer-OG-a-ma), Noct. 3, 96, Walk. C.B.M. 1202, Grt. Trans. Am. Ent. Soc. 4, 9, Streck. Rho. Het. 22, pl. 3, f. o, *Bunker*i, Grt. Can. Ent. 8, 230.

Primaries pale wood brown, t.a. line geminate, edged outwardly by a broad white shade reaching from costa to subreniform; subreniform diffuse, pale brown, with broad lighter band outwardly; t.p. line distinct. Secondaries black, with a narrow even yellow band. Expands 80—85 mm. Habitat, Eastern, Middle and Western States.

The variation named *Bunker*i has slightly more brown over the median space of primaries, and the median band of secondaries narrower.

28 *verrilliana*, Grt. Can. Ent. 7, 185, Buf. Bull. 3, 217, Harvey, Buf. Bull. 3, 12, *Ophelia*, Hy. Edw. Bull. Brookl. Ent. S. 2, 95, l.c. 3, 58, *Violenta*, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 58.

Primaries gray, shaded with blackish, a diffuse black basal dash, t.a. densely shaded with black, reniform small, yellowish, more or less distinctly double ringed; t.p. line much as in *blandula*. Secondaries bright red, median black band narrow, quite even, not reaching anal margin, marginal band narrow. Expands 50—60 mm. Habitat, Cal. to Texas. Food plant, Scrub Oak.

Ophelia differs only in having somewhat heavier lines on primaries; *verrilliana* is always described with bright red secondaries; *Violenta* is somewhat larger and has more black.

Var. *votiva*, Hulst. Secondaries clear yellow. Habitat Arizona.

29. *ultronia*, Hub. *Eunetis ultronia*, Sam. 2, 26, 174, f. 347, 348, Verz. 1721, *Cat. ultronia*, Guen. Noct. 3, 89, Walk. C.B.M. 1197, Pack. Guide, 317, pl. 8, f. 4, Saun. Can. Ent. 12, 4.

Primaries light gray fawn, dark almost black along inner margin, basal dash and one at sinus present; a subapical dark shading; t.p. line fine, strongly dentated to sinus. Secondaries bright red, median band broad, rather even, reaching anal margin. Expands 60—70 mm. Habitat, East of the great Plains, and Texas.

Var. *Celia*, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 58. Median band of secondaries linear. Florida.

Var. *Mopsa*, Hy. Edw. l.c. 3, 58. Primaries nearly uniform brown.

Var. *Adriana*, Hy. Edw. l.c. 3, 57. Primaries nearly uniform fawn drab.

Var. *Herodias*, Streck. Rho. Het. p. 121. Primaries uniform dark smoky gray; denticulations of t.p. line very strong, and thus continued to inner margin.

Larva, Guen. Noct. 3, 89, Pack. Guide, 317, pl. 8 f. 4a, Saun. Can. Ent. 6, 147, l.c. 12, 4. Tapers to both ends, about 2 inches long, color from clear gray to very dark brown, with darker dots and reddish tubercles; on 8th segment a fleshy protuberance, concolorous with body or reddish; a reddish lunule on 11th segment; two anterior pairs of abdominal legs in earlier stages much smaller than the others. Feeds on Wild Cherry, Plum, Dogwood and Live Oak.

30. *coccinata*, Grt. Trans. Am. Ent. Soc. 4, 6, Streck. Rho. Het. 21, pl. 3, f. 9, *Circe*, Streck. l.c. 121, Grt. N.A. Ent. p. 22.

Primaries clear cinereous, basal dash present, lines clear, distinct, the t.a. and t.p. lines approximating inferiorly, reniform whitish, annulate; subreniform white; a black dash at sinus, apical dash evident, veins marked with black near margin. Secondaries bright red; median band even, reaching anal margin. Expands 55—65 mm. Habitat East of the Miss. and Tex. *Circe* simply has the black on primaries more marked.

Var. *sinuosa*, Grt. Bull. Brookl. Ent. Soc. 1, 77, Can. Ent. 11, 15. Median band of secondaries linear.

Larva, Coquillett, Papilio, 1, 56. Body dark gray, a protuberance on 8th segment, and two slight ones on 11th; head gray, edged with black. Feeds on Oak.

31. *Ilia*, Cram. *Phalœna Ilia*, Pap. Ex. 1, 53, pl. 33. figs. B, C, *Eunetis Ilia*, Hub. Verz. 2717, *Noctua Ilia*, Oliv. Ency. Meth. 9, 266, 181, *Cat. Ilia*, Guen. Noct. 3, 91, Walk. C.B.M. 1199, Grt. Trans. Am. Ent. Soc. 4, 8.

Primaries dark cinereous, powdered with glaucous scales, and shaded with black; basal dash present, t.a. line geminate, reniform whitish, with black internal ring, subreniform pale, subquadrate; M of t.p. line produced. Secondaries deep orange red, with irregular median band. Expands 80—90 mm. Habitat U. S., east of Rocky Mts. Olivier says it is found also in the Island of Jamaica.

Var. *uxor*, Guen. (nec. Hub.) Noct. 3, 92, Walk. C.B.M. 1199, Grt. Trans. Am. Ent. Soc. 4, 8, *umbrosa*, Worth., *confusa*, Worth., *decorata*, Worth., *obsoleta*, Worth., *duplicata*, Worth., *conspicua*, Worth. Primaries brown gray, reniform white.

Var. **Zoe**. Behr. Trans. Am. Ent. Soc. 3, 24, Hy. Edw. Proc. Cal. Acad. Sci. July 1875. Secondaries lighter orange. Cal.

Var. **osculata**, Hulst. Secondaries clear yellow. Ariz.

Larva. Koebele, Bull. Brookl. Ent. Soc. 4, 22, Caulfield, Can. Ent. 7, 208, French, l.c. 16, 12. Color of body varying from greenish gray to dirty brown, very largely given by numerous striations and lines; sometimes pinkish anteriorly; piliferous spots more prominent than usual, no protuberance on 8th segment, those on the 11th variable, head bilobed, greenish gray to brown. Length 2.5 to 3.5 inches.

Ilia is the most variable of all our species. In some cases the primaries are strongly mixed with blue. I am unable to separate Mr. Worthington's examples as proper varieties. If allowed, we must have at least 50 more names, to express the changes of this variable insect.

32. **Aholibah**, Streck. Rho. Het, 72, pl. 9, f. 5, Hy. Edw. Proc. Cal. Acad. Sc. July 19, 1875, p. 26. Primaries dark gray, strongly shaded with black, basal dash present, t.a. line geminate, diffusely black; M of t.p. line strongly produced, reniform clouded, subreniform small, nearly white, a band of brown beyond t.p. line; a faint subapical shading. Secondaries like *Ilia* with a shading to the ground color, generally quite violet. Expands 75—80 mm. Habitat, Cal., Northward.

A species subject to very considerable variation, and in many instances very closely approximating certain forms of *Ilia* both in fore and hind wings.

33. **marmorata**, Edw. Proc. Ent. Soc. Phil. 2, 508. Streck. Rho. Het. 73, pl. 9, f. 6, Hy. Edw. Proc. Cal. Acad. Sci. July 1875, Angus, Can. Ent. 9, 239.

Primaries diffuse light gray, with bluish shading, t.a. line edged inwardly with white, t.p. line heavy, M broad, but not greatly produced; a diffuse black shading running from costa, nearly hiding reniform and ending subapically. Secondaries rather dull red.

One of our largest, rarest, and most scattered species. Expands 100—110 mm. Habitat Northern U.S.

34. **parta**, Guen. Noct. 3, 84, pl. 16, f. 1, Grote, Trans. Am. Ent. Soc. 4, 6, Streck. Rho. Het. 38, pl. 5, f. 10, *perplexa*, Streck. l.c. 38, pl. 5, f. 11, *amatric*. Walk. C.B.M. 1195.

Primaries close smooth even bluish gray, with basal, apical, and sinus shadings, lines fine, but distinct; M of t.p. line produced, a white band from within reniform, extending obliquely outward, including subreniform, not reaching inner margin. Secondaries rather dull red, median band even, curved, not reaching inner margin. Expands 80—85 mm. Habitat Eastern U.S.

Perplexa is slightly more shaded with blue and lighter.

Var. **petulans**, Hulst. Secondaries yellow, with just a shading of reddish along anal margin.

Larva; Hy. Edw. Papilio, 3, 24. Dull fawn color; a pale brownish dorsal, and a subdorsal line slightly waved; also a brown stigmatal line; head edged with a black line. Food plant Willow and Poplar.

35 *unijuga*, Walk. C.B.M. 1194, Grote, Trans. Am. Ent. Soc. 4, 5, Streck. Rho. Het. 37, pl. 5, f. 9, *junctiona*, Grt. (nec. Walk.) Trans. Am. Ent. Soc. 4, 5, Can. Ent. 9, 168, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 56, *Lucilla*, Worth. Papilio 3, 40.

Primaries very light squamose gray, heavily powdered and shaded with black atoms; the base, reniform and terminal space, especially heavily shaded; t.a. line geminate, diffuse; t.p. line rather heavy, M not very strong, the line below dentate; subreniform white; a diffuse white spot beyond reniform; s.t. line white, dentate. Secondaries red, somewhat shaded at base, with black median band strong, reaching anal margin; marginal band broad. Expands 80—85 mm. Habitat, N.E. U.S. and Northward.

I am not able to see any distinct difference in *Lucilla*.

Var. *Meskei*, Grt. Can. Ent. 5, 161, l.c. 5, 233, l.c. 9, 168, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 55.

Primaries somewhat lighter than *unijuga*. Secondaries with median and marginal bands narrower, the former not reaching anal margin.

Var. *beaniana*, Grt. Can. Ent. 10, 195, Noct. N.A. '67, pl. 4, f. 42, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 55.

Primaries darker than *unijuga*. Secondaries with median band more even, not reaching anal margin.

Larva; Kellicott, Can. Ent. 13, 38, Bunker (*Meskei*), l.c. 15, 100. Gray to gray drab; nearly concolorous, without protuberances. Food plant, Poplar and Willow.

36 *pura*, Hulst, Bull. Brookl. Ent. Soc. 2, 96, Papilio, 1, 218, Grote, l.c. 1, 163, Can. Ent. 15, 11, 13.

Primaries white, lightly and diffusely shaded with blackish; lines much as in *unijuga*; submarginal space whitish, evenly and strongly dentate outwardly; a slight longitudinal shading from base, across the wing, parallel with inner margin often present. Secondaries bright red; marginal band not much curved, short. Expands 75—80 mm. Habitat, Col. and New Mexico.

I would have no hesitancy in referring *pura* as a synonym of *semi-relicta*, and both as a var. of *Briseis*, were it not that in *pura* the hind tibiae are spinulated. In coloration they very closely resemble each other. It is my present idea that *pura* is the form *unijuga* takes in Col. and N. Mex., as *Stretchii* may be along the Pacific Coast.

37 *Stretchii*, Behr. Trans. Am. Ent. Soc. 3, 24, Hy. Edw. Cal. Acad. Sci., July 19, 1875.

Primaries like *unijuga*, but without white beyond reniform, and on subreniform; and with shadings of cream brown, especially on median space and beyond t.p. line. Secondaries bright red, bands narrower than in *unijuga*. Expands 80 mm. Habitat, Cal. and Ariz.

Var. **Portia**, Hy. Edw. Bull. Brookl. Ent. Soc. 2, 94. Secondaries with margin broken.

Var. **Augusta**, Hy. Edw. Proc. Cal. Acad. Sci. Oct. 18, 1875. Primaries with less bluish, and lacking cream brown; lines lighter.

Var. **Hippolyta**, Hy. Edw. Proc. Cal. Acad. Sci. July 19, 1875; Streck. Rho. Het. p. 99, *Jessica*, Hy. Edw. Proc. Cal. Acad. Sci. Jan. 15, 1877. Even blue gray; lines indistinct. Secondaries with both bands very narrow, rectangular near anal margin. *Jessica*, has these tendencies not so marked as *Hippolyta*.

38. **Rosalinda**, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 55.

Primaries much like *Faustina* though less definite. Secondaries like *Stretchii*. Expands 70—75 mm. Habitat, Col., Kansas.

39. **Faustina**, Streck. Rho. Het. 21, pl. 3, f. 8. Hy. Edw. Proc. Cal. Acad. Sci. July 1875, *Perdita*, Hy. Edw., Streck. Rho. Het. 100, l.c. 129, Proc. Cal. Acad. Sci. July 1875, *Zillah*, Streck. Rho. Het. 129.

Primaries bluish gray, powdered with brown atoms; lines well defined; reniform distinct, annulate; subreniform white; a white space within reniform. Secondaries bright red; median band moderately wide, angulated at center outwardly. Expands 70—75 mm. Hab. S. Cal. and Ariz.

Zillah has more reddish on secondaries.

40. **verecunda**, Hulst. Primaries light cream gray; lines and secondaries practically as in *Faustina*. Expands 70—75 mm. Habitat, Montana.

Taken in numbers by H. K. Morrison.

41. **allusa**, Hulst. Primaries light gray; heavily marked with blackish; basal space very dark; t.a. and t.p. lines very heavy; reniform nearly black; subreniform round, whitish; spots of s.t. line, and s.t. spots suffused together, forming a row of lengthened quadrate spots. Secondaries as *Faustina*. Expands 75 mm. Habitat, Wash. Ter.

42. **Mariana**, Hy. Edw. Proc. Cal. Acad. Sci. July 19, 1875, Streck. Rho. Het. 99.

Primaries dark iron gray with a bluish tinge; lines as *Briseis*; reniform blackish and indistinct; subreniform lighter. Secondaries rose color; bands as in *Faustina*. Expands 70—75 mm. Habitat, Cal.

Var. **Francisca**, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 57. Primaries with a uniform dull greenish tinge.

43. **Briseis**, Edw. (Bris-E-is), Proc. Ent. Soc. Phil. 2, 508, Grote, Trans. Am. Ent. Soc. 4, 5, Streck. Rho. Het. 20, pl. 3, f. 7, *parta*, Walk. C.B.M. 1193.

Primaries gray brown; lines indistinct; M of t.p. line not strongly produced, teeth moderately broad, the lower the smaller; t.p. line evenly scalloped below to sinus, which is not deep; reniform indistinct; subreniform lighter; submarginal space much lighter. Secondaries bright red, with bands as in allied species, save that median band generally reaches anal margin. Expands 75—80 mm. Habitat, Northern and Eastern U.S.

Var. *grotiana*, Bailey, N.A. Ent. 21. Larger than *Briseis*, with subreniform and s.m. space white, and strongly contrasting. Median band of secondaries as in allied species.

Var. *semirelicta*, Grt. 6th An. Rep. Peab. Acad. Sci. 39, Buf. Bull. 2, pl. 1, f. 11, Papilio 1, 163, Can. Ent. 15, 11, Streck. Rho. Het. 121, Hulst, Papilio 1, 218, Bull. Brookl. Ent. Soc. 3, 11. Very like *pura* in appearance q. v.

44. *Hermia*, Hy. Edw. Bull. Brookl. Ent. Soc. 2, 93.

Primaries brown gray; lines and markings very distinct; t.p. line like *Briseis* save that the sinus is deep, so it nearly reaches t.a. line near inner margin. Secondaries as in allied forms. Expands 80 mm. Habitat, Col.

45. *electilis*, Walk. C.B.M. 1209, Butler, Papilio 1, 171.

Primaries dark cinereous, speckled with black, and with a blackish diffuse band across the middle concealing the reniform spot; lines distinct; submarginal line undulating, incomplete. Secondaries as in allied species. Expands 80 mm. Habitat, Cal. Mex.

• Var. *californica*, Edw. Proc. Ent. Soc. Phil. 2, 509, Streck. Rho. Het. 98 pl. 11, f. 13, Hy. Edw. Proc. Cal. Acad. Sci. July 1875.

Primaries much lighter; submarginal white line prominent, distinct, serrate.

• Var. *Cleopatra*, Hy. Edw. Proc. Cal. Acad. Sci. July 1875, Streck. Rho. Het. 99. Color of *californica*, but with lines indistinct and s.m. band hardly apparent. Habitat, Cal.

• Var. *Irene*, Behr. Trans. Am. Ent. Soc. 3, 24, Hy. Edw. Proc. Cal. Acad. Sci. July 1875; *Virgilia*, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 56. Primaries brown. Habitat, Cal.

Var. *Volumnia*, Hy. Edw. l.c. 3, 56. Primaries much dashed with white; median band reaching anal margin.

Var. *Valeria*, Hy. Edw. l.c. 3, 56. Primaries light fawn color; median band narrow. Habitat, Ariz.

It has been difficult for me to arrive at a decision with regard to a number of species given above. *Faustina* will I am confident be found to intergrade with *verecunda*; likewise *Briseis* with *Mariana*; indeed of *Briseis* I have a specimen from New York, which is the counterpart of *Mariana*. In fact from *verecunda* through *Faustina*, *allusa*, *Mariana*, *Briseis*, *Cleopatra*, *Hermia*, and *californica* to *Irene*, I am confident from the various collections about New York a complete and unbroken series of intergrading specimens could be made. The above however gives my present opinion in view of what I think can be relied upon.

46. *Luciana*, Hy. Edw. Proc. Cal. Acad. Sci. July 1875, Streck. Rho. Het. p. 99; *Nebraska*, Dodge, Can. Ent. 7, 2, Grote, l.c. 7, 2, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 54.

Primaries brownish gray, with yellowish tinge; all the lines and spots heavy and strongly marked, shading into black on the margin; reniform large, blackish, surrounded with a paler ring; subreniform open, fawn drab. Secondaries yellowish red; median band narrow, widest at center, not reaching anal margin. Expands 75—80 mm. Habitat, Nebraska, Kansas, Col.

Var. **Somnus**, Dodge, Can. Ent. 13, 40. Primaries head and thorax black, thinly powdered with gray scales; abdomen and long scales at base of hind wings black.

47. **concumbens**, Walk. C.B.M. 1198, Grote, Trans. Am. Ent. Soc. 4, 7, Streck. Rho. Het. 39, pl. 5, f. 12; *Diana*, Hy. Edw.' Bull. Brookl. Ent. Soc. 3, 57.

Primaries pale violaceous brown, mixed with gray, lightest towards costa, lines fine, but distinct; reniform vague, whitish, pale brown within. Secondaries bright pink; median band very broad, rapidly narrowing towards anal margin, which it does not reach; the submarginal pink space even, through its whole length. Expands 75 to 85 mm. Habitat, N. and N.E. U.S. and Northward.

Diana has the abdomen partly pink.

Aber. **Hillii**, Grt. Papilio, 3, 43. Secondaries yellow in place of pink.

Larva; Saun. Proc. Ent. Soc. Phil. 2, 29. Head dark gray intermixed with red; upper surface dirty brown, with light dorsal stripe; a small protuberance on 8th segment, and lunule on 10th. Food plant, Willow and Poplar.

48. **cara**, Guen. Noct. 3, 87, Walk. C.B.M. 1196, Grote, Trans. Am. Ent. Soc. 4, 7, Streck. Rho. Het. 98, pl. 11, f. 14.

Primaries deep blackish brown; lines narrow, distinct anteriorly; lines and veins shaded with olivaceous. Secondaries intense rose red, with a broad even black median band reaching anal margin. Expands 85—95 mm. Habitat, Middle and Eastern States and Northward.

Var. **carissima**, Hulst, Bull. Brookl. Ent. Soc. 2, 97, *Sylvia*, Hy. Edw. l.c. 3, 57. Primaries rich velvety brown, spotted and flecked with olivaceous scales, which form a large spot at apex. Expands 90—100 mm. Habitat, S. and E. from *cara*. *Sylvia* is slightly more spotted with olivaceous.

Larva; French, Papilio 2, 157, Koebele, (*carissima*) Bull. Brookl. Ent. Soc. 4, 22.—2.5 inches in length. Color after 1st moult, whitish green; after 2nd, almost black; after 3rd, striped with two shades of brown, this color remaining through the rest of the history; the lighter color prevails dorsally the darker laterally; two subdorsal black lines, and one stigmatal; a protuberance on 8th segment, pale orange, spotted with black; head brown, mottled with blackish caraneous; it moults 5 times. Food plant, Willow and Poplar.

49. **amatriz**, Hub. *Lumprosia amatriz*, Noct. f. 487, Saml. 2, f. 3, 4, Verz. 2722, *Cat. amatriz*, Guen. Noct. 3, 86, Grote, Trans. Am. Ent. Soc. 4, 7, Streck. Rho. Het. 98, pl. 11, f. 15, *selecta*, Walk. C.B.M. 1197, *nurus*, Walk. C.B.M. 1195, Streck. f. 16, *Editha*, Edw.

Primaries even light brown, nearly unicolorous; lines fine distinct; M of t.p. line strongly produced, teeth about equal; reniform darker, doubly annulate; subreniform lighter. Secondaries rosy red; median band generally much like *cara*, but not reach-

ing anal margin; when narrow, it is incised within at the middle of wing. Expands 95—105 mm. Habitat, East of the Miss., Texas and Ariz.

Nurus differs in having the longitudinal shading.

Larva; Kellicott, Papilio 1, 142, French, l.c. 4, 8. Ground color very pale lilac white, with 3 dorsal and 3 lateral stripes; slight protuberance on 8th segment, clay colored; a pair of slight protuberances on 11th segment. Food Willow and Poplar, moults 5 times.

50. *junctura*, Walk. C.B.M. Grt. Can. Ent. 14, 47, l.c. 15, 12, *Walshii*, Edw. Proc. Ent. Soc. Phil. 2, 509, Grt. Can. Ent. 5, 233, l.c. 15, 12, Papilio 1, 163, Hulst, l.c. 1, 218, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 55.

Primaries dark cinereous very slightly and partly clouded with black; lines indistinct, slightly and diffusely bordered with brown, as is also the subreniform; s.t. line dentate quite distinct. Secondaries red lead color; median band rather narrow, nearly straight, angulated near end, not reaching anal margin. Expands 100—110 mm. Habitat, Texas.

Var. *Arizonae*, Grt. Can. Ent. 5, 163, l.c. 5, 233. Primaries a little darker, with less brown; lines a little more distinct.

Very close to *junctura*, but the form seems to be permanent in Colorado, and incidental through Utah and Southward. (See note below on *babayaga*.)

Var. *Aspasia*, Streck. Rho. Het. p. 94. Primaries largely light creamy brown, less unicolorous than *junctura*. S.W. Texas.

Var. *Cassandra*, Hy. Edw. Proc. Cal. Acad. Sci. July 1875, Bull. Brookl. Ent. Soc. 3, 56, *Sara*, French, Can. Ent. 15, 163.

Primaries much darker, almost black on basal space, along inner and outer margin.

51. *babayaga*, Streck. Papilio 4, 73, *Arizonae*, Grt. Can. Ent. 13, 232, l.c. 15, 12:

Primaries rich velvety reddish brown; otherwise as *junctura*. Expands 100 mm. Habitat, Ariz. Food plant, Willow (Auct. Doll.).

Mr. Grote has long claimed this insect to be his *Arizonae*; but his type of *Arizonae* is in the possession of the Ent. Soc. of Phila. and is not this species. Nor does his description tally with this, but with the type. We can not take his recollection against this evidence.

52. *relicta*, Walk. C.B.M. 1193, *Cat. fraxini*, Guen. Noct. 3, 83, Grote, Trans. Am. Ent. Soc. 4, 4, Can. Ent. 7, 186, l.c. 8, 231, Streck. Rho. Het. 19, pl. 3, f. 5, 6, *Bianca*, Hy. Edw. Bull. Brookl. Ent. Soc. 3, 54, *Phrynia*, Hy. Edw. l.c. 3, 54.

Primaries white, powdered and shaded more or less with black; easily known by the even white median band on the otherwise black secondaries. Expands 80—85 mm. Habitat, Middle and Eastern States and Northward. Food plant, White Birch and Silver Poplar; and probably all species of *Betula* and *Populus*.

Phrynia, differs from the lighter type form by having the fore wings pretty evenly powdered with black, and *Bianca* by having the basal space, and the t.p. region quite dark.

53. *tristis*, Edw. Proc. Ent. Soc. Phila. 2, 511, Grote, Trans. Am. Ent. Soc. 4, 4, Streck. Rho. Het. 17, pl. 3, f. 1.

Primaries light gray, blackish along inner margin, lines indistinct; t.p. line without prominent teeth; reniform blackish; subterminal line white, serrated. Secondaries black; fringe white at apex. Expands 40—50 mm. Habitat, Eastern, Middle and Western States, and Northward.

54. *Epione*, Dru. (Ep-I-o-ne), *Noctua Epione*, Ins. 1, 47, pl. 23, f. 2, Cram. Pap. Ex. 2, pl. 102, f. E, F, Fab. Sys. Ent. 3, 2, 163, Oliv. Ency. Meth. 8, 288, 190, *Mormonia Epione*, Hub. Verz. 276, 2712, *Cat. Epione*, Guen. Noct. 3, 93, Walk. C.B.M. 1200, Grote, Trans. Am. Ent. Soc. 4, 2.

Primaries very dark gray; lines heavy; t.p. line not strongly angulated, and almost without sinus; reniform reddish; a reddish band beyond t.p. line then, lighter often almost white, serrated outwardly. Secondaries black; fringes pure white.

Larva; Guen. Noct. 3, 93. Body reddish gray, marbled with bluish gray; a subdorsal black line interrupted at the middle of each segment; a paler lateral band; no protuberances; head gray with two red points. Feeds on Oak.

§§§ CATABAPTA, Hulst.

55. *antinympa*, Hub. *Ephesia antinympa*, Verz. 278, 2731, *Phalaena para-nympa*, Dru. Ins. 1, 49, pl. 23, f. 6, *Cat. affinis*, West. Dru. 1, 44, pl. 23, f. 6, *melanynmpa*, Guen. Noct. 3, 98, *antinympa*, Walk. C.B.M. 1203, Grote, Trans. Am. Ent. Soc. 4, 13, Streck. Rho. Het. 36, pl. 5, f. 7.

Primaries dead black, with velvety black lines; often a lighter spot before reniform and subreniform. Secondaries bright yellow; median band even, moderately broad. Expands 50—60 mm. Habitat, Eastern, Middle, and Western States.

56. *serena*, Edw. Proc. Ent. Soc. Phila. 2, 510, Grote, Trans. Am. Ent. Soc. 4, 13, Streck. Rho. Het. 23, pl. 3, f. 11.

Primaries close even uniform smoky gray; lines fine but distinct; t.p. line with but one prominent tooth; reniform brownish; subreniform round, a little lighter. Secondaries light yellow; median band narrow, angulated; yellow interspace, often very narrow. Expands 60—65 mm. Habitat, Northern and Eastern U.S. It also occurs in Eastern Siberia. Food plant, Hickory, (Auct. Angus).

57. *badia*, G. & R, Proc. Ent. Soc. Phila. 6, pl. 4, f. 1, Trans. Am. Ent. Soc. 4, 12, Andrews, Can. Ent. 8, 198.

Primaries pale chestnut brown, with two transverse dark brown shades obscuring the ordinary lines; the first within the t.a. line, the second over and without the t.p. line. Secondaries light bright yellow, quite even, middling broad. Expands 60 to 70 mm. Habitat, Eastern, and Middle States to Mass. Food plant, Wax Myrtle, (*Myrica*).

Var. *coelebs*, Grt. Trans. Am. Ent. Soc. Sept. 1874, Can. Ent. 10, 233, l.c. 15, 23, Hulst, Bull. Brookl. Ent. Soc. 3, 9.

Primaries with brown all lost, being replaced with black and gray, and these broken up; lines very distinct; appearance decidedly like *consors*. Secondaries like *badia*. Found in Maine and N. New York.

Var. *Phœbe*, Hy. Edw. MSS. A form intermediate between *coelebs* and *badia*, in which the brown holds, but is broken into bands and edgings, and the lines are distinct. Found in Mass. and N. Hampshire.

58. *muliercula*, Guen. Noct. 3, 97, Walk. C.B.M. 1203, Grote, Trans. Am. Ent. Soc. 4, 12, Streck. Rho. Het. 74, pl. 9, f. 9.

Primaries deep rich brown shaded with bluish over the median space; lines distinct; t.a. line rather heavy near costa; t.p. line with M prominent; s.t. white space evident; subreniform light. Secondaries deep yellow; median band moderately broad, often quite constricted near middle; marginal band broad, with two scallops inwardly. Expands 60--70 mm. Habitat, Eastern, Middle, and Western States.

Var. *peramans*, Hulst. Primaries darker. Secondaries almost entirely black, the yellow interspace showing only brokenly.

Larva; Guen. Noct. 3, 97. The larva is very much attenuated, quite narrow at the extremities and swollen in the middle. It is reddish yellow in color with gray subdorsal and stigmal lines; the head is concolorous with the body with two white dashes laterally. Feeds on Wax Myrtle (*Myrica*).

59. *habilis*, Grt. Trans. Am. Ent. Soc. 4, 11, *basilis*, Grt. Can. Ent. 8, 230.

Primaries quite unicolorous pale gray with a greenish tint; lines black, narrow, often indistinct; M of t.p. moderately strong, the upper tooth the more prominent; submarginal space whitish, serrated. Secondaries dull, dark yellow; median band rather slight, constricted, narrowing towards anal margin and often reaching it. Expands 60--70 mm. Habitat, Eastern, Middle, and Western States. Food plant, Hickory, (Auct. Angus).

Basilis differs only in the presence of the basal dash.

60. *innubens*, Guen. Noct. 3, 98. Walk. C.B.M. 1203. Grote, Trans. Am. Ent. Soc. 4, 8, *Hinda*. French, Papilio 1, 111.

Primaries rich brown, powdered with glaucous scales; lines distinct, black; M of t.p. line strong, teeth broad, even; reniform brown, annulate with pale white; subreniform pale, often nearly white, small; at the apex resting on costa is a large triangular whitish spot. Secondaries reddish orange; median band rather broad, quite even. Expands 65--70 mm. Habitat, Eastern, Middle, and Western States. Food plant Walnut.

Hinda has broad, darker brown shading from base to apex.

Var. *flavidalis*, Grt. Papilio 1, 63. Secondaries yellow.

Var. *scintillans*, G. & R. Proc. Ent. Soc. Phila. 6, 28, pl. 4, f. 6, Trans. Am. Ent. Soc. 4, 8.

Primaries very dark, nearly black, uniform to t.p. line.

61. *paleogama*, Guen. (pal-le-OG-a-ma), Noct. 3, 97, Walk. C.B.M. 1202, Grote, Trans. Am. Ent. Soc. 4, 10, Proc. Ent. Soc. Phila. 3, pp. 87, 541, pl. 3, f. 2, *Annida*, Fager, Can. Ent. 14, 120.

Primaries gray, powdered with greenish gray and black scales, and shaded with blackish, and with bright brown in s.t. space; lines rather broad, distinct; reniform rounded, brown or black, indistinct; subreniform pale, small; sinus of t.p. line broadly marked, acute, not deep; teeth of M strong. Secondaries dark yellow; median band narrow, much constricted, reaching internal margin. Expands 70—75 mm. Habitat, Eastern, Middle, and Western States. Food plant, Walnut.

The larva I have taken with those of *neogama*, but it was not enough different to arrest my attention. *Annida* differs in having the posterior half of the primaries darker.

Var. *phalanga*, Grt. Proc. Ent. Soc. Phila. 3, 86, pl. 3, f. 1, Trans. Am. Ent. Soc. 4, 11. Primaries with basal space black, a black band beyond t.p. line, the rest light gray.

62. *neogama*, Abb. & Sm. (ne-OG-a-ma), *Phalaena neogama*, Lep. Ga. 2, 175, pl. 88, Oliv. Ency. Meth. 8, 290, 195, West. Nat. Lib. 37, Ex. Moths, 202, pl. 26, f. 1, 2, *communis*, Grt. Trans. Am. Ent. Soc. 4, 9, *neogama*, Guen. Noct. 3, 96, Walk. C.B.M. 1202, Streck. Rho. Het. 35, pl. 5, f. 4, 5, Grt. Papilio, 1, 163, l.c. 2, 8.

Primaries light gray, marked within t.a. line. at reniform, and beyond t.p. line, with light brown; all lines evident, but not always distinct; M of t.p. line produced, sinus large; basal and subapical dashes generally present. Secondaries yellow, median band constricted and angulated. Expands 75—90 mm. Habitat, East of Rocky Mounts and Ariz. *Communis* has the hind wings a little darker yellow than the type form.

Var, *snowiana*, Grt. Pap. 1, 163, l.c. 2, 8. Described from an aberrant and somewhat aborted specimen from Kansas, with primaries much more heavily marked with black. It is with great hesitancy I write this a variety.

The specimens from Ariz. have the marginal border of the hind wings broken.

Larva; Guen. Noct. 3, 96. Color brownish gray, formed by many longitudinal striae on light ground; piliferous points separate as is usual. Feeds on Walnut.

63. *subnata*, Grt. Proc. Ent. Soc. Phil. 3, 326, Trans. Am. Ent. Soc. 4, 9, Streck. Rho. Het. 34, pl. 5, f. 3.

An insect very much like *neogama*, but generally larger, with lines and markings more diffuse, and the teeth of the M of t.p. line very strongly produced. Expands 95 to 105 mm. I have seen a specimen, which would not measure more than 70 mm. Habitat, Eastern and Middle U.S. Food plant, Walnut, (Auct. Angus).

I am in much doubt as whether this is a distinct species. Mr. Grote

gives 5 points of difference; the more slender body parts, the greater expanse, the large open subreniform, the paler hind wings, and the more acutely dentate t.p. line. But all these vary through both species. I see nothing but a more general diffuseness, a very unsatisfactory specific distinction.

64. **piatrix**, Grt. Proc. Ent. Soc. Phila. 388, 532, pl. 3, f. 3, Trans. Am. Ent. Soc. 4, 10, Streck. Rho. Het. 74, pl. 9, f. 8.

Primaries dark wood brown, or blackish brown, slightly silky, darker shaded in the subbasal space, on the costa, above discal cell, and subapically; t.a. line geminate, outer line sometimes less distinct; reniform shaded with black; subreniform pale; t.p. line with M prominent, and sinus heavy; s.t. line geminate, with grayish between. Secondaries deep yellow, internal margin and base dusky; median band not much constricted. Expands 85—95 mm. Habitat, East of Plains. Food plant, Walnut, Hickory and Persimmon, (Auct. Koebele).

Var. **Dionyza**, Hy. Edw. MSS. A form from Arizona with lighter primaries, and with secondaries bright yellow.

65. **nebulosa**, Edw. Proc. Ent. Soc. Phila. 2, 510, Streck. Rho. Het. 75, pl. 9, f. 11, Grote, Trans. Am. Ent. Soc. 4, 11, *ponderosa*, G. & R. Proc. Ent. Soc. Phil. 6, 23, pl. 4, f. 2.

Primaries gray cream color, variable in depth of tint, much shaded with deep brown; basal space dark brown or black, except along inner margin; reniform doubly annulate, not distinct; subreniform small; t.p. line distinct, M prominent, the lower tooth shorter; outer third browner with violet shade. Secondaries dark yellow, median band not much constricted; marginal band broad; margin yellow. Expands 90—100 mm. Habitat, Middle and Western States.

✓ 66. **Judith**, Streck. Rho. Het. 95, pl. 11, f. 5. Hulst, Bull. Brookl. Ent. Soc. 3, 8, Papilio 1, 215, *Levettei*, Grt. Trans. Am. Ent. Soc. Sept. 1874, Papilio 1, 160.

Primaries close even light gray, with a dusky shade; lines fine, faint, sometimes partly obsolete; no basal or apical dashes; reniform brownish, annulate with whitish; M of t.p. line with upper tooth broad, much the larger; a s.t. lighter band, toothed strongly at M of t.p. line. Secondaries black, fringes dark. Expands 40—50 mm. Habitat, Eastern and Middle States. Food plant, probably Hickory, (Auct. Angus.)

Var. **Miranda**, Hy. Edw. Papilio 1, 111. Differs in being smaller, and with fringe of secondaries whitish on outer margin to apex.

67. **Robinsonii**, Grt. Trans. Am. Ent. Soc. 4, 20, Streck. Rho. Het. 71, pl. 9, f. 1, *curvata*, French, Papilio 1, 218.

Primaries even, smooth, pale greenish cinereous, generally without shades; lines fine, distinct; M of t.p. line middling strong; a black shading on costa at reniform; reniform lighter; a s.t. white space beyond t.p. line. Secondaries black; fringe white. Expands 75—80 mm. Habitat, Middle and Western States. Food plant, Hickory, (Auct. Angus). *Curvata* is the name given to the form with basal and apical dashes.

68. *dejecta*, Streck. Bull. Brookl. Ent. Soc. 2, 97.

Primaries narrower and more pointed than usual, light gray, heavily shaded with bluish, without dashes; a pale spot before reniform, which is dark; subreniform lighter; M of t.p. line strong, teeth subequal. Secondaries black; fringe white blackish at ends of veins. Expands 70—75 mm. Habitat, Eastern, Middle, and Western States.

69. *resecta*, Grt. Trans. Am. Ent. Soc. 4, 4, Streck., Rho. Het. 71, pl. 9, f. 2, *flebilis*, Grt. Trans. Am. Ent. Soc. 4, 4, Can. Ent. 8, 229, Streck. Rho. Het. 71, pl. 9, f. 3, 4.

Primaries pearly cinereous, dash at base, and at sinus of t.p. line; lines distinct; M of t.p. line strongly produced, teeth nearly equal. Secondaries black; fringe white. Expands 70—75 mm. Habitat, Middle and Western States. Food plant, Hickory (Auct. Angus).

Flebilis has a diffuse black shading reaching from base, longitudinally across wing to apex.

70. *luctuosa*, Hulst. Primaries like *resecta* in markings, but with apical shading; wings broader and outwardly more rounded, and more or less generally covered with a brownish shading, often with a violet tinge. Secondaries black, with fringes broader and dull white, and marked with black at end of veins. Expands 75—80 mm. Habitat, Middle, and Western States. Food plant, probably Hickory.

This species I find in collections generally labelled *resecta*. Mr. Grote in his description speaks nothing of the reddish, and Mr. Strecker's figure does not show it. The typical specimens in Phila. cover both species. I describe and name the form, Mr. Grote did not.

71. *vidua*, Abb. & Sm. *Phalœna vidua*. Lep. Ga. 181, pl. 92, Grote, Trans. Am. Ent. Soc. 4, 3, Check List N.A. Moths, p. 65, *desperata*, Guen. Noct. 3, 95, Walk. C.B.M. 1200, Grote, Trans. Am. Ent. Soc. 4, 3, Streck. Rho. Het. 33, pl. 5, f. 2, Hulst, Bull. Brookl. Ent. Soc. 3, 12.

Primaries with the color of *resecta* and markings of *luctuosa*, through these are here heavier and more decided; t.a. line heavily geminate, connecting half way with heavy black basal dash; apical and sinus shading heavy; t.p. line with M very much produced. Secondaries black, slightly gray at base; deep white fringe; in some specimens there is near anterior margin a faint indication of a white median band. Expands 80—90 mm. Habitat, Middle, Western, and Southern States.

Larva; greenish gray, with many black lines; whiter laterally; slight protuberances on each segment; head gray, edged behind with black. Feeds on Oaks, (Abb.), Hickory, (Angus), and Walnut, (Koebele).

72. *mæstosa*, Hulst, *vidua*, Guen. (nec. Abb. & Sm.) Noct. 3, 94, *viduata*, Guen. Noct. 3, 400, Grote, Trans. At. Am. Ent. Soc. 4, 3, Check List, N.A. Moths, p. 65, Streck. Rho. Het. 17, pl. 3, f. 2, Hulst, Bull. Brookl. Ent. Soc. 3, 12.

Primaries very nearly the color of *vidua*; lines diffuse, not strongly distinct; t.p. line with M strong; sinus comparatively small; no basal dash; reniform reddish; reddish band beyond t.p. line; t.a. clouded with black at costa, and a heavy diffuse black shade from costa above reniform, through M of t.p. line to below apex. Secondaries black, dull gray at base; fringe white, ends of veins black. Expands 95—105 mm. Habitat, Southern States. Food plant, Walnut.

I have made the disposition of this species I have, as I see no other way out of the difficulty. It seems universally agreed that *desperata*, Guen., is *vidua*, Abb. and Sm. There is no course to follow, but that which is always taken, to call it by the name under which it was first described, and under which it, its larva, and food plant were as well figured. The name *desperata* can not properly stand. *Mastosa* is the insect called *viduata* by Guen., which was only a putting in another form the name *vidua* of Abbott, whose species Guenée thought this was. *Vidua* and *viduata* are practically the same names; were meant to be the same. The only solution, and the one which has been universally followed in the science, is to give the mistaken species a name, which I have here done.

73. *lacrymosa*, Guen. Noct. 3, 93. Walk. C.B.M. 1199, *lachrymosa*, Grote, Trans. Am. Ent. Soc. 4, 19. Streck. Rho. Het. 18, pl. 3, f. 3. *Uhulume*, Streck. l.c. 133.

Primaries light cinereous, heavily and quite uniformly powdered with black atoms; slight basal dash present; lines fairly strong, but often lost in the black powdering; t.a. line often confused and broken; t.a. line with teeth medium; reniform brownish; a brownish band beyond t.p. line. Secondaries black, fringe white, black at end of veins. Expands 75—85 mm. Habitat, lower Middle and Western States and Southward. Food plant; probably Oak and Walnut.

Uhulume differs in being less strongly powdered with black, and in having with the lines more distinct.

Var. *Evalina*, French, Papilio 1, 110. *Emilia*, Hy. Edw., l.c. 1, 117. A form having the basal, outer third, and inner half of the primaries nearly or quite black.

Var. *Zelica*, French, Papilio 1, 110. Primaries with t.a. line inwardly, and t.a. line outwardly, having a black band across the wing.

Var. *Paulina*, Hy. Edw., Bull. Brookl. Ent. Soc. 3, 54. Primaries black to t.p. line.

74. *Sappho*, Streck. Rho. Het. 95, pl. 11, f. 4. French, Papilio 1, 57.

Primaries pure white, somewhat clouded with black and light brown; lines indistinct; reniform reddish; black on costa at beginning of t.a. line, and above reniform. Secondaries black, fringes white or dark. Expands 75—80 mm. Habitat, Western States and Southward.

75. *Agrippina*, Streck. Rho. Het. 95, pl. 11, f. 1, 2.

Primaries uniform blackish gray, powdered with dusky reddish brown; lines black, heaviest on costa; reniform indistinct, brown; brown band beyond t.p. line. Secondaries black; fringes dull white. Expands 75—85 mm. Habitat, Middle and Southern States.

Var. *subviridis*, Harv. Can. Ent. 9, 193, Streck. Rho. Het. 95, pl. 11, f. 3. Primaries shaded with light silky green; much lighter along inner margin.

Agrippina is subject to very great variation in the color of primaries.

76. *insolabilis*, Guen. Noct. 3, 94, Walk. C.B.M. 1200, Grote, Trans. Am. Ent. Soc. 4, 3, Buf. Bull. 187, pl. 5, f. 3, Streck. Rho. Het. 33, pl. 5, f. 1, Hulst, Bull. Brookl. Ent. Soc. 3, 13, Angus, Papilio, 4, 35.

Primaries light blue gray, heavily powdered with black; clouded with black along inner margin; generally on median space, just anterior to this black margin, a triangular pale or white space; basal dash always turned downward outwardly. Secondaries black, fringes dark. Expands 75—85 mm. Habitat, Middle, Western, and Southern States. Food plant, Hickory.

77. *Angusi*, Grt. Can. Ent. 8, 229, Buf. Bull. 187, pl. 5, f. 1, 2, Hulst, Bull. Brookl. Ent. Soc. 3, 13, Angus, Papilio, 4, 35, *Lucetta*, Hy. Edw. French, Cat. Ills. p. 4.

Primaries dark greenish gray; no band on inner margin though often a cloud at sinus of t.p. line and below apex; no triangular white spot on median space; basal dash turning upward outwardly; in these things differing from *insolabilis*. Secondaries black, fringe dark, rarely light. Expands 70—80 mm. Habitat, same as *insolabilis*. Food plant, Hickory (Auct. Angus).

Lucetta differs in having a longitudinal shading from base to beneath apex.

This insect though generally smaller and easily distinguished, often wonderfully resembles *insolabilis*. Indeed the direction of the basal dash is the only feature in one, which I have not seen as well as in the other.

78. *obscura*, Streck. Rho. Het. 19, pl. 3, f. 4, *simulacilis*, Grt. Trans. Am. Ent. Soc. Sept. 1874, Can. Ent. 8, 229, Papilio 2, 8.

Primaries uniform dull smoky gray; lines fine, but distinct; M of t.p. line with upper tooth much the larger; submarginal space whitish, serrated. Secondaries black, fringes white. Expands 70—80 mm. Habitat, Middle, Western and probably Southern States. Food plant, Hickory (Auct. Angus).

Var. *residua*, Grt. Proc. Bost. Soc. Nat. Hist. 16, 242, Buf. Bull. 187, pl. 5, f. 4, Hulst, Bull. Brookl. Ent. Soc. 3, 13, Angus, Papilio 4, 35. Primaries a brighter, bluer color. Secondaries with fringes often dark.

Some notes upon the Catocalæ are to be found as follows; they include lists of captures and general observations. Grote, Can. Ent. 4, 16, l.c. 5, 161, l.c. 15, 11, l.c. 9, 168, Bunker, l.c. 6, 25, Bailey, l.c. 9, 216, Harvey, l.c. 9, 192, Murray, l.c. 9, 18, Dury, l.c. 8, 187, Grote, l.c. 8, 229, French, l.c. 12, 241, Johnson, l.c. 12, 137, l.c. 14, 59, Hulst, Bull. Brookl. Ent. Soc. 3, 1—20, Grote, Papilio 1, 159—164, Hulst, l.c. 1, 215, Grote, l.c. 2, 8, Fernald, l.c. 3, 23, French, Synopsis Cat. Ills. 1882.

ADDENDA AND ERRATA.

Page 13, line 7 from bottom, *Belfragiana* should be *Messalina*.

Page 16, line 20, for "in all cases" substitute the words "very often".

Page 20, line 28, for "adaption" read "adaptation".

Page 25, line 8, for "*elonympha*" read "*Allotria*".

Page 33, line 4, for "1883" read "1882".

Page 35, line 8, for "Trans. Am. Ent. Soc." read Proc. Ent. Soc. Phila." The same correction should be made on the same page lines 17 and 23.

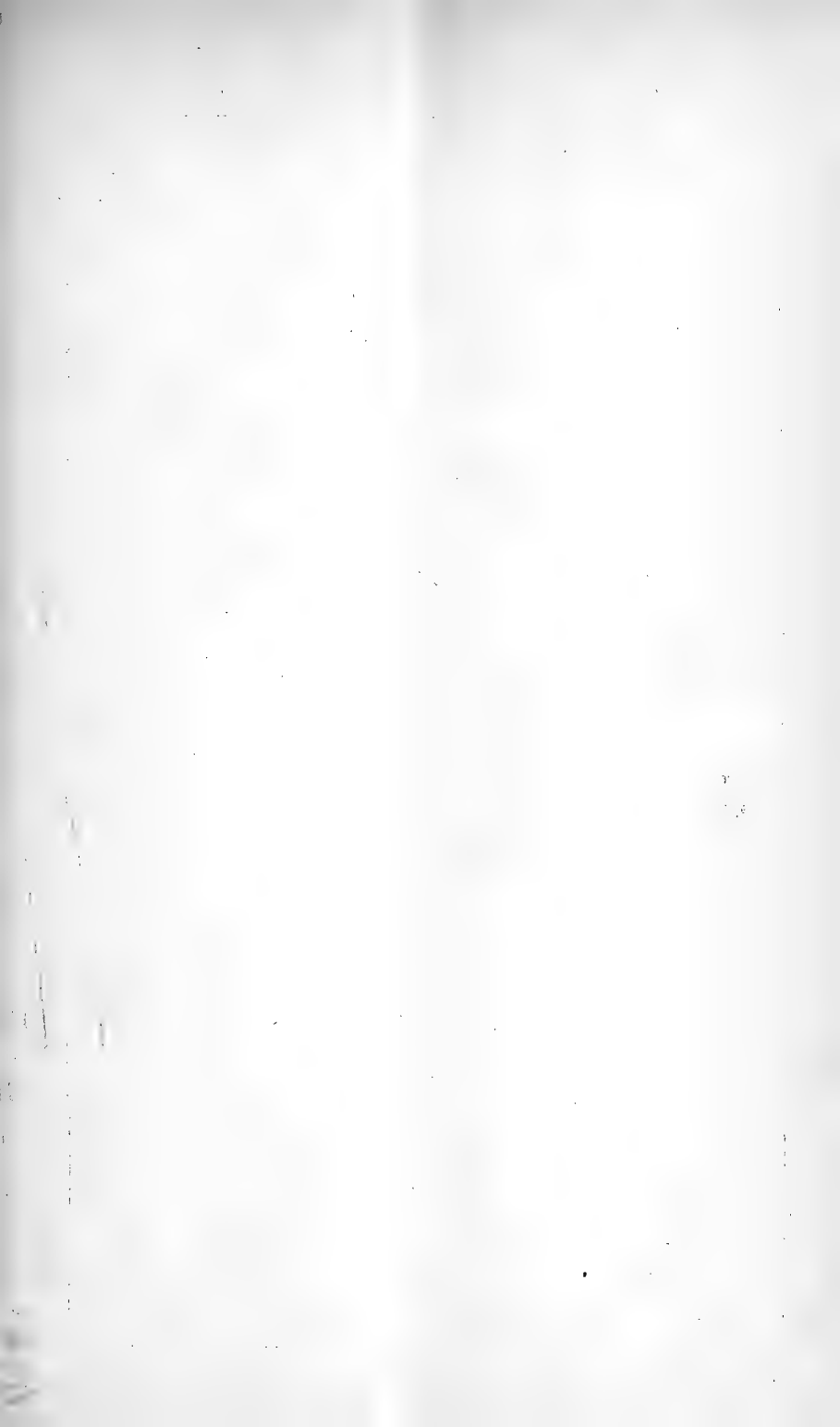
Page 38, line 4, after 103 "(?)" should be inserted.

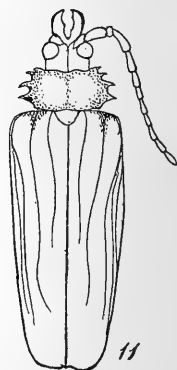
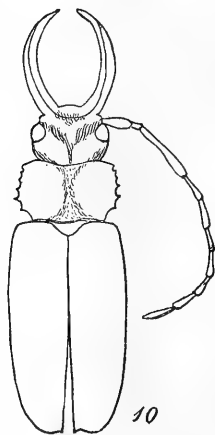
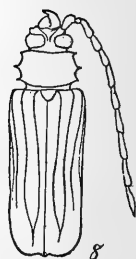
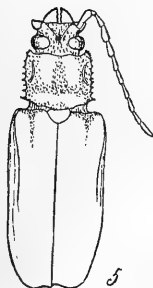
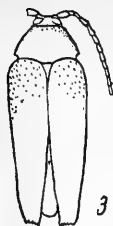
Page 38, line 15, after "writes me" insert "his opinion is". I do not understand that he has ultimate evidence. At any rate the description being based on a picture, can not stand.

Page 51, last line omit "as".

The following words, printed with capital letters beginning, should have been begun with lower case letters: page 24, line 28, *Nubilis*; page 26, line 24, *Verrilliana*; page 34, line 27, *Amica*; page 29, line 28, *Amasia*; p. 13, line 7 from bottom, and page 34, line 1, *Belfragiana*; page 34, lines 27 and 28, *Amica*, *Androphila*, and *Lineella*; page 35, line 4 from bottom, *Grynea*.

The following words beginning with lower case letters should begin with capitals: page 13, last 3 lines, *ilia*; page 29, line 9 from bottom, and page 38, lines 23, 33, 36, 39, 41, and page 39, line 1, *crategi*.





SYNOPSIS OF COLEOPTERA.

PRIONUS, *Geoff.*

This genus and *Homaesthis* constitute the group *Prionini*, all the species of which resemble one another closely in superficial appearance. The body is relatively broader than in any of the other genera and gives the insects a stout or heavy aspect.

The mandibles are moderate in size, acute and similar in the sexes. The eyes are large and coarsely granulated. The antennæ are heavily imbricate in the males, more slender and serrate in the females. The thorax as noted above is tridentate in *Prionus*, unidentate in *Homaesthis*. The elytra are broadly rounded at apex, coriaceous, punctate, and ornamented with raised lines. The legs are slender, compressed and punctate. The species in color are a uniform brown or black.

SYNOPTIC TABLE OF PRIONUS.

Sensitive surface antennæ ♂ and ♀ reticulate with fine elevated lines.

Antennal joints 12; soles hind tarsi densely pubescent.

Elytra at base not wider than thorax..... *laticollis*.

Elytra at base wider than thorax.

First two thoracic teeth prominent not reflexed..... *pocularis*.

First two thoracic teeth very acute and reflexed..... *californicus*.

Antennal joints more than 12; soles hind tarsi with scattered hairs.

Antennal joints ♀ 18, ♂ 18-20..... *imbricornis*.

Antennal joints ♀ 25, ♂ 27-30..... *fissicornis*.

Sensitive surface ♂ uniform.

Antennal joints 12; soles of hind tarsi concave and sparsely pubescent. . *palparis*.

SYNOPTIC TABLE OF HOMAESTHESIS.

Sensitive surface ♂ uniform; soles of hind tarsi concave and sparsely pubescent; antennæ 13-14 jointed.

Thorax strongly punctured, pubescent, lateral tooth very obtuse,.... *emarginatus*.

Thorax slightly punctured, not pubescent, lateral tooth acute..... *integer*.

The tables are exhibited in the above form for the purpose of showing clearly the close relation between the genera, and also the intermediate position which *palparis* occupies.

P. laticollis, Drury, Ill. II, 1773, p. 83, t. 37, f. 2; Harris, Ins. Mass. p. 79, *brevicornis*, Fab. Syst. El. II, p. 260; Beauv. Ins. Afr. et Am. p. 216; Lec. Journ. Ac. Phil. ser. 2, II, p. 109.

The thorax is distinctly wider in this than in any other species, so that it is almost if not quite as wide as the elytra at base. All the joints of the hind tarsi are densely pubescent or spongy beneath, with a smooth median channel. The lateral teeth of prothorax are well developed, sometimes even slightly reflexed as in *californicus*. The color is brownish varying to black. It is generally darker than in the other species. Length, $\frac{7}{8}$ to $1\frac{7}{8}$ inches = 22-47 mm. Habitat, Northern, Middle and Atlantic States.

P. pocularis, Dalm. Schoenh. Syn. Ins. I, 3, 1817. p. 148; *curticornis*, Lec. J. A. P. ser. 2, II, p. 109; *obliquicornis*, Lec. J. A. P. ser. II, p. 108; *laevigatus*, Harris, Trans. Soc. Htford 1836, p. 83, t. 1, f. 6; Lec. J. A. P. ser. 2, II, p. 109; *denticornis*, Sturm, Cat. 1836, p. 187.

The thorax is narrower than the elytra at base, the lateral teeth prominent but never reflexed. The first joint of hind tarsi is almost entirely glabrous, the second and third spongy with a median smooth channel. Color as in *laticollis* but not so dark, antennæ more slender. Length, 1 to 1.75 inches = 25-45 mm. Habitat, Middle and Southern States.

P. californicus, Motsch. Bull. Mosc. 1845, I, p. 89, t. 2, f. 9; Mannh. Bull. Mosc. 1852, II, p. 364; *crassicornis*, Lec. J. A. P. ser. 2, II, 1852, p. 108

The species is distinguished by the very acute and strongly reflexed lateral teeth of prothorax. The soles of the hind tarsi are as in *laticollis*. Color as in preceeding. Length $1\frac{3}{4}$ to $2\frac{1}{2}$ inches = 45-52 mm. Hab. California.

Curvatus is a variety of the last in which the lateral teeth are more reflexed than in the typical form.

The above species are very closely related. The characters given will serve to separate them although specimens will be found which will seem intermediate in form. It is a remarkably interesting fact that the specific differences intergrading as they do are such as are used to separate the genera in many families.

P. imbricornis, Linn. Syst. Nat. Ed. XII, p. 622; Beauv. Ins. Afr. et Am. p. 242, t. 36, f. 2, ♀ Lec. J. A. P. ser. 2, II, p. 108.

The thoracic teeth are much less prominent in this species, showing a gradation to *Homæsthesis*. The number of the antennal joints varies somewhat, in the specimens under examination within the limits given in the table. Each joint in ♂ is conical hollowed to receive succeeding joint and with the lower edge prolonged; in ♀ much more slender and

simply serrate. Elytra ♀ are more convex than ♂. The covering of hair on soles of hind tarsi is very thin and the smooth channel very narrow. Length $\frac{7}{8}$ to $1\frac{3}{4}$ inches = 22—47 mm. Habitat, Southern and Western States.

P. fissicornis, Hald. Proc. Ac. Phil. III, p. 125, Lec. J. A. P. ser. 2, II, p. 108, Col. Kan. t. 1, f. 14.

Thoracic teeth as in *imbricornis*. Antennal joints as in table. Each joint V-shaped, the posterior branch the longer with its apex curved. Joints in ♀ serrate. The joints of the hind tarsi are more slender than in the other species, and the pubescence is as in *imbricornis*. The species is easily known by the number and shape of the antennal joints. Length 1 to 1.6 inches = 25—40 mm. Hab. Nebraska, Texas.

P. palparis, Say, J. A. P. III, p. 327; Lec. J. A. P. ser. 2, II, p. 109.

This species present a curiously intermediate form. The form of the thorax is more convex and the lateral teeth less marked, showing a strong tendency to the form of *Homæsthesis* while the poriferous sensitive spaces of antennæ and the soles of the hind tarsi (which are scarcely pubescent and not at all spongy) are precisely the same as in that genus. The first joint of hind tarsi is shorter than in the other species and the posterior tibiæ are much more bent. Length, 1.1 to 1.5 inches = 24 to 37 mm. Hab. Nebraska.

H. emarginatus, Say, J. A. P. III, 1823, p. 327; Lec. J. A. P. ser. 2, II, p. 107; Col. Kan. t. 2, f. 13. ♀. *innocuus*, Lec. Proc. Ac. Phil. 1862, p. 43, (*Prionus*.)

This species is easily known by the characters given in table. Length .75 inches = 18 mm. Hab. Western States.

H. integer, Lec. J. A. P. ser. 2, II, p. 107.

The acute lateral tooth of thorax, and the lack of pubescence will serve to at once distinguish this species. Length 1 inch = 25 mm. Hab. Col. and West. States.

TRACOSOMA, Serv.

This genus constitutes the tribe *Tragosomini*. The body is elongate, brownish. Head and mandibles small and inconspicuous. Thorax convex, armed with a small single acute tooth on each side, pubescent with long, brownish hair. Elytra also brownish, punctured and finely ribbed, rounded at tip, suture armed with small acute spine; the elytra

are longer and wider than the body. Antennæ slender, nearly filiform, compressed; $\frac{3}{4}$ the length of body ♂, $\frac{1}{2}$ ♀.

The single species is

T. Harrisii, Lec. J.A.P. ser. 2, 1852, II, p. 107. Length, $1\frac{1}{8}$ to $1\frac{1}{4}$ inches = 30 to 35 mm. Hab. Newfoundland to Vanc., Coney Island.

SPHENOSTETHUS, Hald.

This genus is also represented by a single species, a shining black insect which by its tapering form suggests the family *Elateridæ*. The head is small, prothorax large, trapezoidal, smooth, somewhat convex, very obtusely toothed near base; elytra also black, tapering, dehiscent, punctured, tip finely serrate, margin and suture obtusely spinose. The antennæ are less than $\frac{1}{2}$ the length of body, slender, slightly compressed and serrate.

The species is

S. Taslei, Buq. Ann. Fr. 1841, Bull. p. 39; *serripennis*, Hald. Proc. Ac. Phil. III, p. 126, Lec. J.A.P. ser. 2, II, p. 106; *denticulatus*, Westw. Arcan. Ent. I, p. 40, Length, $1\frac{1}{8}$ inches = 29 mm. Hab. Middle States.

ELATEROPSIS, Chev.

This genus closely allied to preceding is again represented by a single species which like the preceding is a shining black insect but with a greenish tinge. It resembles *S. Taslei* in most points and is distinguished therefrom by the sides of thorax being crenulate and acutely toothed near the middle. The tip of the elytra is crenulate and they are not dehiscent. Antennæ $\frac{1}{2}$ length of body slender and compressed.

• The species is

E. fuliginosus, Fab. Syst. Ent. p. 160; Oliv. Ent. IV, 66, p. 37, t. 10, f. 39; Chev. Ann. Fr. 1862, p. 271; *erythromera*, Dej. Cat. 3rd ed. p. 344. Length, $1\frac{1}{4}$ inch. = 32 mm. Hab. Florida.

SUB FAMILY CERAMBYCINÆ.

This subfamily is defined by the following characters, viz: prothorax not margined, labrum separate from the front, front tibiæ not obliquely sulcate, palpi never acute at tip, antennæ always pubescent.

It is divided into the following groups:

- I. Base of antennæ not enveloped by the eyes; antennæ with second joint rather larger; front coxæ transverse, not prominent. **Callidioides**.

- II. Base of Antennæ partly enveloped by the eyes; front coxæ not conical, though sometimes prominent; stridulating plate (absent only in *Molorchus*) large, never divided; ligula membranous (except in the group *Oemes*); 2nd joint of Antennæ small (except in one genus of *Clytini*). **Cerambycoidea.**
- III. Base of Antennæ partly enveloped by the eyes, which are nearly divided, and moderately finely granulated; 2nd joint of antennæ longer than usual, front coxæ globose, widely separated, stridulating plate of mesosternum divided by a small furrow. (Body resembling a *Lamiæ*.) **Atmioides.**
- IV. Base of Antennæ not enveloped by the eyes, which are entire or emarginate, and usually finely granulated; front coxæ conical (except in *Disteniini*); stridulating plate of mesonotum divided by a smooth space or furrow. **Lepturoides.**

CALLIDIROIDES.

1. Ligula corneous, eyes variable. (*Asemini*). 2.
 Ligula membranous, eyes finely granulated. (*Callidiini*). 7.
2. Epimera of mesothorax normal, truncate at inner end. 3.
 Epimera of mesothorax acutely pointed inwardly. 6.
3. Base of prothorax normal. 4.
 Base of prothorax emarginate, filled with a thin plate. 5.
4. Eyes moderate, transverse, finely granulated, hairy.
 Antennæ finely pubescent. **Aseum.**
 Antennæ coarsely pubescent. **Nothorhina.**
 Eyes large, coarsely granulated, not hairy. **Criocephalus.**
 Eyes divided, rather finely granulated. **Tetropium.**
5. Thighs clavate, prothorax with a single lateral acute spine. **Opsimus.**
 Thighs not clavate, prothorax with two acute spines. **Dicenthrus.**
6. Middle coxal cavities widely open externally. **Smodicum.**
7. Mesonotum with a large, undivided very finely striate stridulating surface. 8.
 Mesonotum polished, with large scattered punctures. 9.
 Mesonotum punctured and pubescent at the sides, with a medial stridulating surface. 10.
8. Hind coxæ not prominent, thighs slender. **Gonocallus.**
 Hind coxæ prominent, thighs clubbed.
 Metasternum with scent pores.
 Elytra with ivory lines **Physocnemum.**
 Elytra uniform. **Rhopalopus.**
 Hind coxæ not prominent, thighs clubbed; metasternum without scent pores.
 Prosternum broad or moderate, hind coxæ inclosed by side pieces and 1st ventral segment. **Hylotrupes.**
 Prosternum very narrow, pointed, hind coxæ not inclosed; prothorax rounded. **Phymatodes.**
9. Mesosternum broad emarginate. **Merium.**
 Mesosternum obtusely triangular. **Callidium.**
10. More convex than usual, antennæ shorter and stouter. **Xylocrius.**

ASEMUM.

The four genera first named above form the group *Asemini* of which *Asemum* is the typical form. The species are moderately stout in form with the antennæ never very long. The head and mandibles are small and inconspicuous. The thorax is rounded or angulated at the sides. The elytra are nearly parallel and rounded at the tip. *Asemum* is distinguished from its companions as indicated above by the eyes and the finely pubescent antennæ.

The species may be separated by the following

SYNOPTIC TABLE OF ASEMUM.

Elytra strongly costate; thorax distinctly angulated at the sides near base.

Surface opaque..... *atrum*.

Elytra barely costate; thorax rounded at sides.

Surface opaque; smaller..... *moestum*.

Surface lustrous; larger..... *nitidum*.

A. atrum, Esch. Bull. Mosc. 1830, II, p. 66.

This species is black densely and finely pubescent; elytra ♂ very dark, nearly black, ♀ often testaceous; obsoletely striate and with three strongly, developed costæ, sometimes irregularly interrupted; thorax variously sculptured and obtusely angulated at sides, deeply punctured; antennæ ♀ about $\frac{1}{2}$ the length of the body, ♂ nearly $\frac{1}{2}$; in both sexes serrate. Length 10—17 mm. = .40—.68 inches. Habitat, Western States.

A. moestum, Hald. Trans. Am. Phil. X, 1847, p. 35; Lec. J.A.P. ser. 2, II, p. 35; Dej. Cat. 3d ed. p. 354; *striatum* † Kirby, Fn. Bor. Am. IV, 1837, p. 171; *fuscum*, Hald. l.c. p. 36; *juvencum*, Hald. l.c. p. 36; *substriatum*, Hald. l.c. p. 36.

This species is also black and densely pubescent; elytra varying from brown to black in color and somewhat in the striations, which are sometimes barely visible and sometimes quite distinct. The name *substriatum* has been applied to the form having the more distinct striæ and *juvencum* to the smooth form. It seems unnecessary to continue them. The thorax in all the forms is rounded at the sides, punctured at middle and variously not deeply sculptured. Antennæ as in *atrum*, 11-jointed and very short. Length 12—15 mm. = .48—.60 inches. Habitat, Lake Superior to Florida and eastward.

A. nitidum, Lec. New species II, S.M.C. 1873, p. 169.

This species is larger, more robust than above and is easily known by the less densely punctured thorax as well as the characters of the table. The color is black shining, fusco pubescent with short hair; thorax rounded

at sides; antennæ ♂ $\frac{1}{2}$ as long as body and stouter especially towards the base. Length $17\frac{1}{2}$ mm. = .70 inch. Habitat, Oregon.

NOTORHINA, *Redt.*

This genus contains a single species resembling *Asemum* in general appearance, but distinguishable by the pubescent antennæ. Head as in *Asemum* in shape, and punctate; eyes nearly as large as in *Criocephalus* and deeply emarginate; antennæ hardly half as long as body; thorax rounded at sides, punctate and longitudinally excavated in the middle and rough with elevated points at the sides; elytra finely scabrous with two obsolete lines. The species is

N. aspera, Lec. Proc. Ac. Phil. VII, 1854, p. 18; 1862, p. 42; Ent. Rep. p. 60. Length 18-23 mm. = .72-.94 inch. Habitat, Oregon and Vancouver.

CRIOCEPHALUS, *Muls.*

The species contained in this genus also resemble *Asemum* though generally larger and more sculptured in the thorax. The characters of the genus briefly enumerated are: eyes large, coarsely granulated, not hairy, more or less emarginate. From Dr. Leconte's "New species" is taken the following

SYNOPSIS OF CRIOCEPHALUS.

- A. Third joint of hind tarsi emarginate for half its length, the 4th joint consequently extending as far as the lobes of the 2d joint; elytra finely punctured.
 - Antennæ and legs very slender, hind tarsi with 3d joint twice as long as wide; body more elongate, prothorax not wider than long, rounded on the sides, slightly roughened with elevated points. **productus.**
 - Antennæ and legs less slender, body less elongate, prothorax wider than long.
 - 3d joint of hind tarsi $\frac{3}{2}$ longer than wide; prothorax rounded at the sides and slightly roughened. **agrestis.**
 - 3d joint $\frac{1}{2}$ longer than wide; prothorax angulated at sides and strongly roughened. **asperatus.**
- B. Third joint of hind tarsi bilobed, cleft nearly to the base, 4th joint received into the emargination, not extending as far as the end of the lobes; elytra less finely punctured; sides of prothorax rounded, scarcely asperated.
 - Prothorax deeply impressed, 3d joint hind tarsi nearly twice longer than wide. **montanus.**
 - Prothorax feebly impressed, 3d joint of hind tarsi very little longer than wide.
 - Prothorax very finely punctured. **obsoletus.**
 - Prothorax less finely punctured. **nubilus.**
- C. Eyes smaller, less prominent and more deeply emarginate than in the other species; prothorax and elytra finely punctured, the former rounded, not asperated, feebly impressed at the middle. **australis.**

C. productus, Lec. J.A.P. ser. 2, II, p. 36. Length .9—1.00 inch. = 23—26 mm. Hab. Colorado, Oregon.

C. agrestis, Kirby, Fn. Bor. Am. IV, 1837, p. 140; Lec. J.A.P. ser. 2, II, 1850, p. 36; *foveicollis*, Dej. Cat. 3d ed. p. 354; *impressus*, Luczot Dej. Cat. l.c. Length .9—1.00 inch. = 22—27 mm. Hab. U.S. east of Rocky Mts.

C. asperatus, Lec., Col. of Kans. 1859, p. 19, (Smith. Cont. Knowl. XI). Length .9—1.00 inch. = 24—26 mm. Hab. New Mexico to Montana.

C. montanus, Lec. S.M.C. 1873, p. 170. Length .76—.95 inch. = 19—24 mm. Hab. Colorado.


C. obsoletus, Rand. Bost. Journ. II, 1838, p. 271, Lec. J.A.P. ser. 2, II, p. 196; *obscurus*, Lec. l.c.; *rusticus* † Hald; *paganus*, Dej. Cat. 3d ed. p. 354. Length .94 inch. = 24 mm. Hab. Western New York and Canada.

C. nubilus, Lec. J.A.P. ser. 2, II, p. 36. Length .75 inch. = 19 mm.

C. australis, Lec. J.A.P. ser. 2, II, p. 35. Length .5 inch. = 13 mm. Hab. Georgia.

Explanation of Plate II.

- | | |
|---------------------------|---|
| 1 Asemum moestum. | 8 Orthosoma brunneum. |
| 2 Homaesthesia integer. | 9 Ergates spiculatus. |
| 3 Sphenostethus Taslei. | 10 Stenodontes mandibularis (after Oliv). |
| 4 Criocephalus productus. | 11 Derobrachus geminatus (after Lec.). |
| 5 Mallodon dasystemus. | 12 Antenna of <i>P. laticollis</i> ♂. |
| 6 Prionus laticollis. | 13 " " <i>P. imbricornis</i> . |
| 7 Tragosoma Harrisii. | 14 " " <i>P. fissicornis</i> (side). |
| | 15 " " " " (front). |

 The Entomological Club of the A.A.A.S. will meet Sept. 3d, at 2 P.M. at the Hotel Lafayette, Broad and Sansom Sts., Philadelphia.

NOTES ON COLEOPTERA

By LT. T. L. CASEY, U. S. A.

HARPALUS, Latr.

H. lustrans. This name is proposed for Dr. Le Conte's *H. lucidus*, Proc. Ac. Phil. 1865, p. 104, which is preoccupied, it being applied by Moraw to a Japanese species; Beitr. Käf Jesso. I, 1863, p. 72.

SUNIUS, Steph.

S. similis, Aust. Dr. Le Conte states (Trans. Am. Ent. Soc. VIII, p. 180.) that he cannot distinguish *S. similis* Aust., from *S. longiusculus*. I have before me a specimen from Arizona which is much more robust than *longiusculus*, especially in the head, and in which the elytra are, when compared with the prothorox, very much longer than in that species; this last character is very striking. If the specimen referred to is the *S. similis* of Austin, which there is reason to believe is the case, the two species are undoubtedly distinct.

LITHOCHARIS, Er.

L. tabacina, n. sp. (Fauvel MS.). Form elongated, sides parallel. Pubescence of elytra rather long, sub-recumbent, dense, fine, piceous, much more sparse on the head and prothorax, more sparse and longer on the abdomen. Head quadrate, eyes very moderately prominent, situated at twice their length from the posterior angles; interocular surface feebly and evenly convex, finely, evenly and extremely closely punctate, punctures shallow and variolate, almost coalescent; antennal tuberculation prominent; antennæ as long as the head and prothorax together, slender, first joint as long as the next two together, second joint distinctly shorter than the third, joints five to ten nearly equal, about as broad as long, last joint longer and just perceptibly wider. Prothorax quadrate, smaller than the head; anterior and posterior angles rounded; surface punctured like the head; median line very fine and distinct. Elytra at base one-fifth wider than the prothorax, one-fifth longer than wide; sides parallel and very feebly arcuate; surface depressed, finely and somewhat transversely rugulose. Third and fourth ventral segment equal in width and as wide as the elytra, thence decreasing in width slowly anteriorly, rapidly posteriorly, fifth much the longest. Legs rather short and robust, slightly paler in color. Gular suture very strong posteriorly. Color throughout rather pale castaneous, elytra slightly paler. Length 4.5—5.2 mm.

This fine species appears to be so common, that to leave it longer undescribed seemed to me inexcusable in the present state of the science. The color exactly resembles some of the darker shades of the cured tobacco leaf.

Dermestis Mannerheimii, Lec. This species is undoubtedly distinct from *D. marmoratus*, Say.

The spines which so densely cover the middle tibiæ are long, acute and somewhat slender in the former, and very short, robust and rounded at tip in the latter. The first joint of the middle tarsus is distinctly shorter than the second in *Mannerheimii* and equal in length to the second in *marmoratus*, and the last joint is relatively longer and more slender in the latter. The club of the antennæ is much narrower, less flattened, much paler in color and more uniformly clothed with velvety pubescence in the former than in the latter. The small punctures of the penultimate and antepenultimate segments of the abdomen in the male, are relatively much larger in *Mannerheimii* than in *marmoratus*; in former they are surrounded by a rather large circular area, totally free from pubescence, which does not appear to be the case in the latter.

There are also differences in the form of the scutellum, depth of the depression at the base of the pronotum, position of the eyes, and also great differences in the size and in the color, length and density of the pubescence.

Ancyronyx variegatus (Germ.). This rather rare species occurs somewhat abundantly, adhering to the under surface of pieces of drift-wood, in the small ice-ponds near Babylon, Long Island.

CRYPTOCEPHALUS, Geoff.

It is evident to all who have approached the genus *Cryptocephalus*, that its species must be separated with great caution; nevertheless the present form seems worthy of specific recognition, not on account of coloration, as this should be almost entirely ignored, but because of the evenly ovoidal form, both anteriorly and posteriorly. *Insertus*, Hald. is apparently the only species with which it can be compared, and all the specimens which I have seen agree in being much more squarely truncate behind than the type under consideration. It seems to be very rare.

C. ellipsoidalis, n. sp. Form elongate, oval; body regularly ellipsoidal; surface entirely glabrous, shining. Head immaculate. Prothorax dark, fuscous, immaculate with the exception of two irregular, indefinite, paler, clouded spots, somewhat approximate and situated near the base; surface not punctured. Scutellum moderate. Elytra punctato-striate, sixth row of punctures interrupted. A broad line of black originates at the base of each elytron and the two coalesce on the suture at the center, the united band becoming acute posteriorly. There are also a small detached humeral spot, one irregular spot at the middle attached to the exterior edge of the broad line, and a posterior and longer outer apical detached spot on each elytron, all of black; remainder of elytra rather pale yellow. Under surface fuscous. Legs fuscous, tarsi much darker. Length slightly less than that of *insertus*.

Two specimens, one in the collection of Dr. Horn of Phila. from Mass., the other collected by myself on Long Island; they exhibit scarcely any perceptible variation.

Anthicus californicus, Laf. I have found two specimens of this species in Delaware and two in New Jersey. According to Dr. Horn the lot from which Laferte described *californicus*, did not in reality come from California, but from Texas, which accounts in a manner for the present localition.

APION, Hbst.

After looking carefully over the tables and descriptions in Mr. Smith's paper on the genus *Apion*, without being able to identify it, I am forced to the conclusion that the following species could not have been represented in the material from which the synopsis was prepared, and I therefore feel called upon to describe it, in order to make our list of described species as complete as possible.

A. vespertinum, n. sp. Male. Form slender, very convex. Color grayish-black, luster metallic. Head as long as wide, eyes moderate, rather prominent; interocular surface flat, scarcely as wide as the eye, having two rows of impressed punctures; rostrum short and robust, twice as long as the head, very finely punctulate, rugulose near the base; antennæ black throughout, inserted at a distance from the eye equal to the length of the latter; scape robust, as long as the next two joints together, clavate, first joint of funicle robust, slightly longer than wide, second slightly shorter and much more slender, club elongated, acuminate and well developed, pubescence becoming much thicker and more fuscous in tint toward the tip. Prothorax nearly as long as wide, almost cylindrical, slightly wider at the base, very fully arcuate at the sides in front of the middle; surface regularly punctured, punctures impressed, round, interspaces as wide as the punctures, flat and coarsely granulated; in the middle and at a distance from the base equal to one-seventh the length of the pronotum, there is a well-defined, very deep circular puncture. Elytra together widest in the middle, where the width is nearly twice that of the prothorax; sides regularly arcuate; striæ deep, very finely and feebly punctured, intervals slightly wider than the striæ, convex and feebly rugulose; along the crest of each interval is a row of very minute punctures. Legs moderate, femora not tuberculate, tibiæ much longer than the femora. Length exclusive of beak 1.9 mm.—Female. Beak two and one-half times as long as the head, robust; antennæ inserted at a distance from the eye equal to one and two-thirds times the length of the latter, longer than in the male, club smaller and narrower, scape slender as long as the first and second funicular joints together, first joint of funicle much longer than wide, oval, much more robust than the scape, second scarcely more than one-half as long as the first: there is a minute furrow between the rows of punctures on the head, which does not appear in the male. The circular puncture of the pronotum is at a distance from the base equal to one-fifth the length. The prothorax is longer than wide. Length not including beak 2.2 mm. California.

The entire body is covered very sparsely with very long, narrow, cinereous scales, which resemble hairs; they are recumbent and generally grow from the punctures. The species appears to be very distinct by reason of the clearly defined, deep, circular puncture near the base of the prothorax, and the four specimens which I have under examination exhibit no perceptible variation, except that due to sex. The humeral angles of the elytra are well developed.

Apion obsoletum, Smith. Occurs in great abundance amongst the tall weeds crowning the banks of the Susquehanna river opposite Wilkesbarre. In the smaller specimens with the shorter beaks (the so-called males) the scape of the antennæ is equal in length to the next two joints together, and is inserted at a distance from the eye equal to the length of the latter, while in the specimens with the longer beaks, the scape is equal in length to the next four joints together and is inserted at a distance from the eye equal to one and two-third times the length of the latter.

Society News.

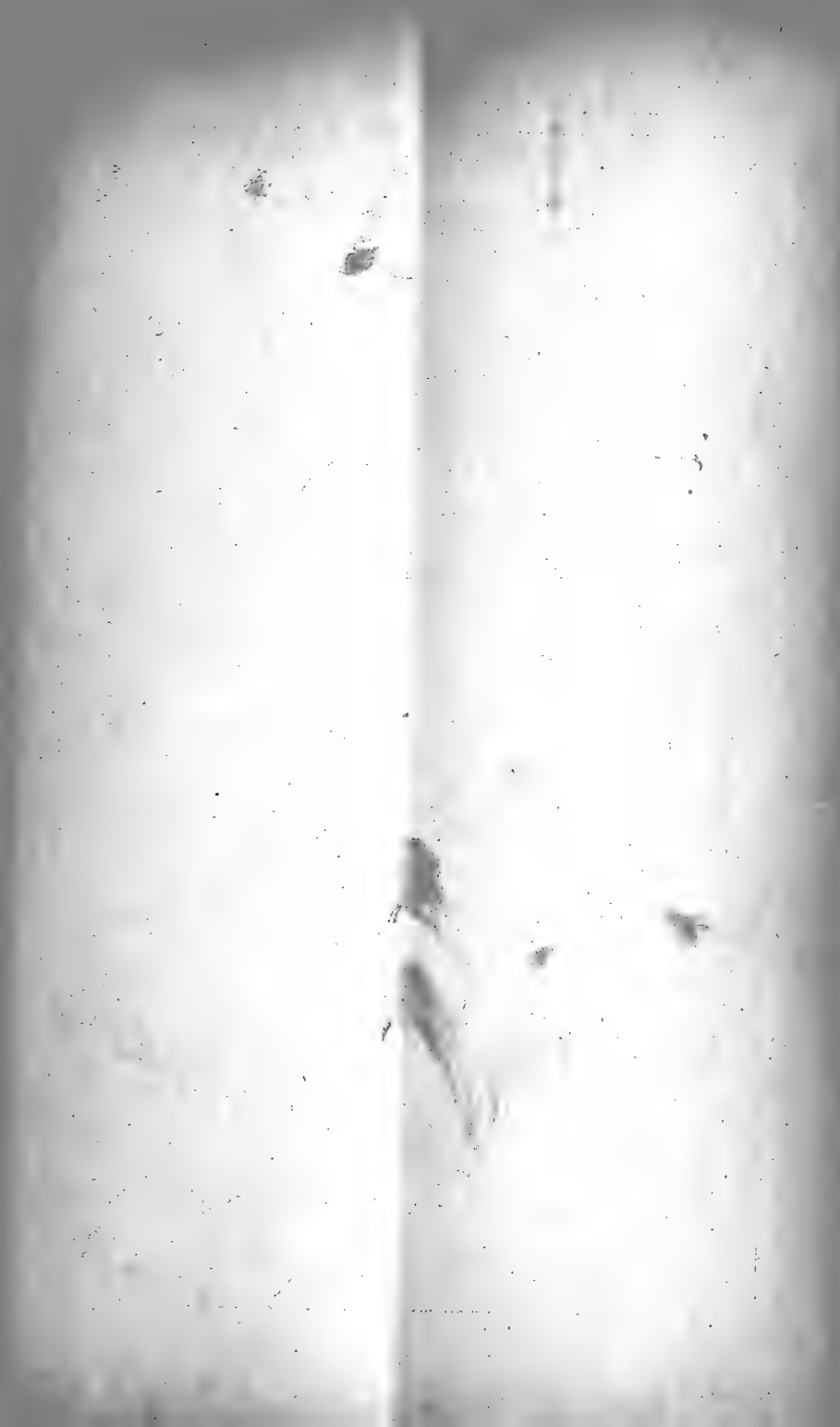
At the May meeting of the Society 8 members were present, Mr. Smith in the chair. The correspondence of the Society was reported as very large, and portions of general interest were read. A letter was received from Dr. A. S. Packard, Jr., acknowledging his election as an Honorary member. A large number of donations to the library were received during the past month, and an exchange of publications with the American Museum of Nat. Hist. was made. Mr. Roberts gave his experience in collecting *Elmidae* at the Clifton Excursion of the Society. Four species were taken on roots and sticks in the water. At first sight nothing could be discovered on the sticks, but after careful search, and when the stick began to dry off, minute points scarcely relieved from the surface of the wood began to move, and with a little practice the specimens could be perceived and picked off with a knife blade. The bad fortune following many in collecting these forms can be explained by the fact that even a tolerably close search on a stick fresh from the water will fail to reveal the species; the stick must begin to dry before the beetles begin to move. Mr. Schwensen called attention to food habits of some *Cryptocephalidae*. Some species are very local favoring single species of plants, others are omnivorous found everywhere. Mr. Smith showed a simple oven for drying and inflating larvæ; formed of a spice box fastened to an upright which in turn was fastened to a platform on which was a small spirit lamp. General discussion on methods of preserving larvæ so as to retain their natural color and shape then followed until the meeting adjourned.

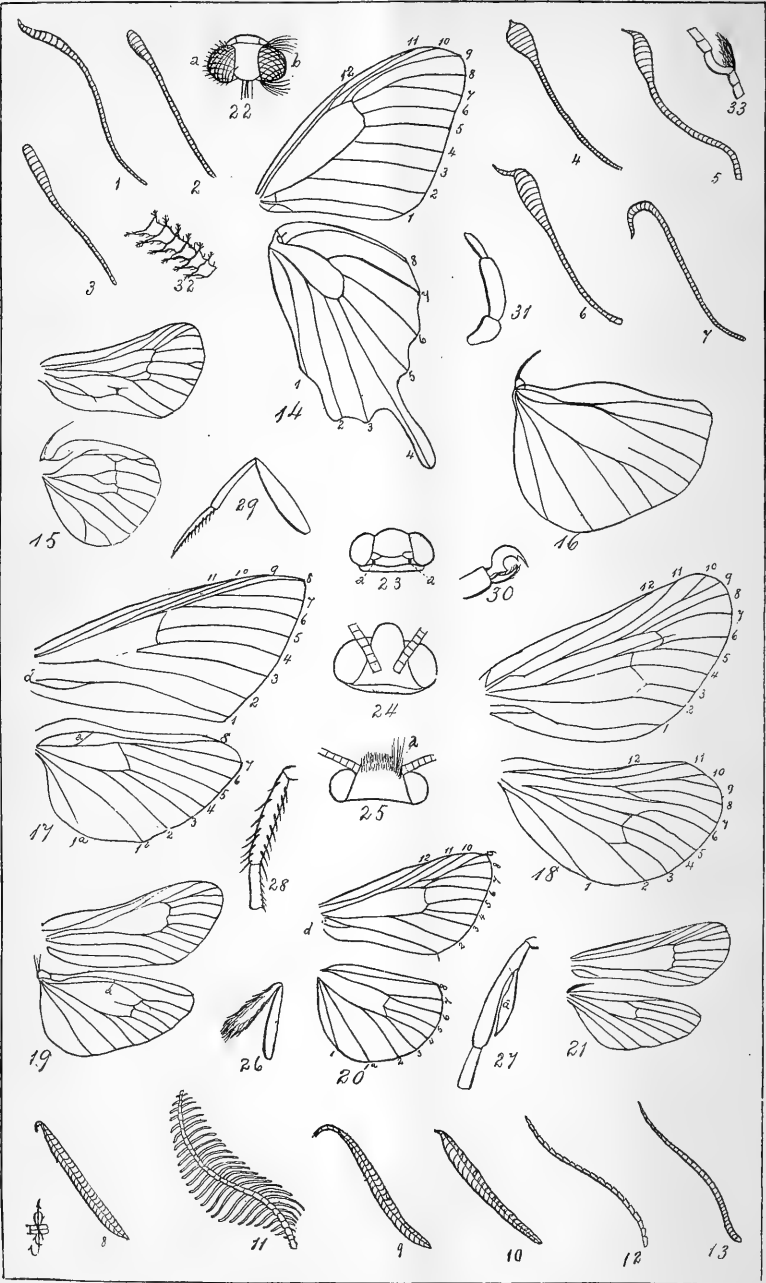
June meeting.—Mr. M. L. Linel of Brooklyn was proposed for membership by Mr. Weeks. A paper on the habits of some *Cicindelidae* by Warren Knaus of Salina, Kans., was presented for publication. Mr. During exhibited an apparatus for cutting larva and cocoons from trees; a height of 25 feet could be reached by its means.

Mr. Weeks explained how he secured all of the living material taken in the beating net. The whole rubbish accumulated in the net is dumped into a long narrow bag which is tied at the ends; when reaching home the contents of this bag are transferred to a large earthen jar fitted with a tight wooden bung in the centre of which is an opening sufficiently large to admit the mouth of a large bottle which is inverted over it. From the inner side of this bottle several strings proceed long enough to reach to the bottom of the jar. The insects aiming for the light climb up the strings into the bottle and may be transferred into the cyanide bottle without difficulty. The advantages of this method are that nothing escapes from the sweep net while picking out desiderata, and that there is no necessity of looking over the rubbish to pick out the insects.

Mr. Smith read a paper on some structural peculiarities of the Noctuidæ with reference to their Geographical distribution calling attention to the fact that the northern species referred to *Plusia* had narrow ovate eyes, and spinose tibiæ and were not congeneric with the more southern forms. *Culophysia* is proposed for these forms, which have also usually yellowish secondaries.

Members are hereby notified that there will be no meetings during the months of July and August.





Explanation of Plate III.

- 1 Antenna of *Papilio*. Club gradual, regularly arquate.
- 2 " " *Pieris*. Club distinct.
- 3 " " *Colias*. Club obconic, truncate at tip.
- 4 " " *Argynnis*. Club broad, spatulate (spoon shaped).
- 5 " " *Aegiale*. Club terminating in a short acute point.
- 6 " " *Pamphila*. Club with an abruptly recurved tip.
- 7 " " *Eudamus*. Club very gradual, pointed, greatly recurved at tip.
- 8 " " *Deilephila*. Form prismatic, tapering to tip, which is abruptly recurved.
- 9 " " *Philampelos*. Tip gradual and moderately curved.
- 10 " " *Macroglossa*.
- 11 " " *Attacus*. Lengthily bipectinate.
- 12 " serrate.
- 13 " setaceous; most *Noctuidae*.
- 14 Wings of *Papilio*. Veins numbered; primaries. 1 *vena internalis* or *dorsalis*; dorsal or internal vein; often termed *submedian* vein. 2, 3 and 4 are termed median nervules, arising from the *median* vein. 5 and 6 are discoidal nervules, arising from the vein closing the discal cell. 7 to 11 are branches from the subcostal. 12 *vena costalis* or costal vein. Secondary. 1 internal or free vein. 2, 3 and 4 branches of median vein. 5 discoidal vein; termed the independent in *heterocera*. 6 and 7 branches of the subcostal. 8 costal vein.
- 15 Venation of *Thyridopteryx*; aberrant: median cell divided, internal vein branched, and in primaries furcate at base.
- 16 Secondary of *Cymatophora* (*Bombycia*). Showing the juncture of the costal and subcostal veins.
- 17 Wings of *Deilephila*. Primary: d. dorsal vein furcate at base. Secondary: a. an oblique branch between costal and subcostal veins. 1a & 1b 2 internal or free veins.
- 18 Wings of *Hepialus*. Both wings 12 veined, the median cell divided, accessory cell present; aberrant.
- 19 Wings of *Zygaena*. Primaries with 2 simple dorsal or internal veins. Secondaries with an oblique branch between costal and subcostal veins (a).
- 20 Wing of *Agrotis*. Showing typical noctuid venation; dorsal vein of primaries furcate at base (d); accessory cell present, at upper outer margin of discal cell.
- 21 Wings of *Aegeria*. Internal vein of primaries wanting. Secondaries without costal vein.
- 22 Head of *Noctua*. a eyes hairy, unlashd; b eyes naked, fringed above and below with long hairy lashes.
- 23 Head showing location of ocelli (a a).
- 24 Head of *Papilio*. Antennæ approximate, head narrow.
- 25 Head of *Hesperia*. Antennæ widely separated, head very broad; a, a bristly tuft at base of antenna.
- 26 Anterior leg of *Nymphalis*. Tarsi wanting, tibia brush like.
- 27 Anterior tibia of *Papilio*, *Hesperia* and the *Heteroceri* generally; showing a the tibial epiphysis; single spur of anterior tibia of some authors.
- 28 Tibia spinose.
- 29 Tibia of *Chrysophanus* ♂. Tibia normal, tarsi exarticulate, consisting of a single long joint with a corneous, claw like tip.
- 30 Claw of tarsi, often simple, more usually dentate as in figure.
- 31 Palpus. Varying much in proportion and shape in the different families, but among the macros never with more than 3 joints.
- 32 Serrate and bristled antenna greatly enlarged.
- 33 Bend and tuft found in the ♂ antennæ of some *Deltoids*.

An introduction to a Classification of the N. A. Lepidoptera.

BY JOHN B. SMITH.

How do you know this is a *Bombycid*, and this a *Pyralid*? These are questions not infrequently asked by collectors and young entomologists when their material is named for them, and they discover that their arrangement according to apparent resemblance, was widely at fault. Now although an old collector or an advanced student can tell almost at a glance, to which group or even genus, a species is referable, yet this knowledge has come to him only by years of collecting, or by close study of large collections and a free use of literature, and this intuitive knowledge cannot be imparted. An explanation of the technical characters of the group or families is incomprehensible, because unfortunately few indeed are acquainted with the characteristics that are used in family classification. To give an answer to these questions—to furnish in concise, yet sufficiently clear terms the characters of the various families and at least their principal genera—to illustrate as much by pencil as by pen, the structural peculiarities of the Lepidoptera, is the object of the present series of papers.

First will be given a brief review of the main characters used, then a translation and modification of Dr. Herrich-Schäffer's table of families, which though not entirely accurate when applied to our fauna, still forms the basis of the present classification of American Lepidoptera, and must therefore be studied. Then will come a more complete definition of each family, exceptions and relationships will be noted, a brief synopsis of at least the leading genera, and the characters used in generic separation will be given. Finally, will be given a synoptic classification of the Lepidoptera, reference being had only to the American forms.

The first character made use of is found in the antennæ, which are either enlarged or clavate at tip, as in the *diurnes* or *Rhopalocera*, prismatic, as in the *Sphingidae*, and setaceous or bristle form, as in the *Bombycidae*, *Noctuidae*, and *Geometridae*. The families in which the antennæ are not clavate at tip are classed as *Heterocera*. Of the clavate antennæ there are many modifications, the chief of which are shown on plate III. Fig. 1, of *Papilio*, has an elongate, regularly arcuate club; in f. 2, *Pieris*, it is conic and somewhat flattened; in f. 3, *Colias*, cylindric obconic, obtusely terminated at tip; in f. 4, *Argynnis*, it is abrupt,

flattened and somewhat spoon shaped; in f. 5, *Aegiale*, it is gradual, cylindrical, suddenly terminating in an acute tip; in f. 6, *Pamphila*, it is more abrupt, and with an abruptly bent and longer, acute tip; in f. 7, *Eudamus*, the club is very gradual, re-curved toward, and gradually terminating in an acute tip. Among the *heterocerous* antennæ that of the *Sphingids* is usually prismatic, more or less serrate and sometimes pectinate in the male, and often terminating in an acute spine. Fig. 8, shows that of *Deilephila*; f. 9 shows a somewhat different form in that of *Philampelos*; while f. 10 shows the form in *Macroglossa*. A pectinate antenna is shown by f. 11; a serrate, at f. 12; and a simple setaceous antenna at f. 13. There are other modifications which will be noticed further on, but the presented types are all that are at present important.

The legs, are of some importance in family classification, and more particularly the anterior pair. In the *Rhopalocera* they may be complete in both sexes, complete in ♀ and more or less aborted in the ♂, or the fore legs in both sexes may be aborted. The plate shows figures of *Papilio*, *Nymphalis*, and *Chrysophanus* ♂, as illustrating the variation. It is somewhat curious that in a subfamily of the *Deltoids* we again find a somewhat similar abortion in the ♂, though very different on the whole from that in the *Nymphalidae*.

The variation in tibial armature has rather a generic than family value, and will be again referred to.

It is the neurulation of the wings, that in Herrich-Schäffer's system plays the most important part, and which it is absolutely necessary to study to refer with certainty an aberrant or unusual form.

On the plate are given figures sufficient to illustrate the following table and explanation; but it is of great importance that the student try and follow the explanation in nature, as the part or vein once recognized will be always remembered.

To prepare wings so that they can be examined, soak them for a moment in alcohol to remove the fatty matter, then place them in a saturated solution of chloride of lime until the color is all gone—this will take only a short time—then wash thoroughly in water, to which a few drops of hydro-chloric acid may be added, until all trace of the lime is gone, then dry on a slide, plate or blotter, and mount as most convenient for examination; either on a glass slide in balsam which has been diluted with chloroform, or on a card by means of balsam, gum, or any other desired medium except shellac. In this way the venation can be

thoroughly studied, but it of course involves the destruction of a specimen. In practice, and after the student is familiar with the typical form of venation, only a limited portion of the wing need be examined, and this can be done by carefully denuding of scales, so much of the underside, as is necessary to expose the venation which is to be examined. The denuding can be done with a fine sable or camels hair brush, and the wing being sustained by the thumbnail of the left hand, will still remain perfect on the upper side.

Various methods of nomenclature have been in use to designate the nerves or veins: they have been divided into nervures and nervules, veins, venules and veinlets, and special names have been given to each branch. The simplest method is that adopted by the German entomologists of merely numbering the veins, and this method I use in this paper, giving a number to each vein that reaches the costal or outer margin, number one being the vein reaching the margin nearest to the anal angle.

Normally the primaries have 12, the secondaries 8 veins, though the internal veins whether one or two in number count only as one, for reasons hereafter explained; there may be and usually are 9 veins though counting as but 8. The costal margin of primaries is usually thickened to the apex, and forms the costa or costal vein of some authors which bears no number. From the base to the costal margin beyond the middle, runs vein 12 of the numeral system and this is the *vena costalis* of Herrich-Schäffer. Below the costal, also from the base runs the discal vein (*subcostal* of H.S.), which gives out mediately or immediately six branches. The first and second of these, No. 11 and 10 in the numeral system, to the costa, before the apex; No. 9 may arise out of 10, or out of the main stem. No. 8 usually runs to the apex, and is generally one tine of a fork out of the main stem. No. 7 is variable, but usually from the main stem, while No. 6 is normally from the extreme end of the discal vein when there is no accessory cell; or, if there is one, then from the middle of the lower margin of that cell. The accessory cell, is a small usually diamond shaped cell at the upper outer angle of the discal cell, and is formed generally by the junction of veins 8 and 9 near their inception, though this origin may be and indeed generally is confused and not readily traceable. The cell itself when present, is easily seen. These veins 6—11 form the discal or subcostal system. From the base, running through and rather beyond the middle of the wing, is the median vein which gives out four branches, all of which run to the outer margin. Of these, the lower, No. 2, or sub-

median of some authors is usually from about the middle of the wing to near the hind angle. The others are usually close together from the end of the vein. From the end of the discal, to the end of the median vein, is usually a fine cross vein which closes the discal cell. Beneath the median vein from the base to the outer margin at or near the hind angle, is the internal vein or veins: No. 1 of the system. This may be simple and single throughout its course, or it may be furcate toward the base. Sometimes a complete cell is formed, but more usually there is only a recurved spur near base. This furcation is given great value by Herrich-Schäffer and is relied upon by him to isolate the *Noctuidae*.

The range of variation in venation of primaries, is comparatively limited: rarely there are two internal (dorsal) veins counted as 1, and 1a; usually there is one, and in the *Sesiidae* there is none; often an accessory cell is present; in the *Noctuidae* usually, in the *Bombycidae* rarely. Veins 6 to 10 are the most variable, but their variations have sometimes not even a specific value, and are never a family characteristic. Rarely the median cell is distinctly divided by a complete vein, but in most forms of *Heterocera* a distinct fold or rudimentary vein is traceable. The position of v. 5, is of great importance in classification. Usually, and in the *Noctuidae* always, it is close to v. 4, but occasionally it is nearer to v. 6 than 4, and this is the usual structure in the *Geometridae*.

Occasionally the primaries have but 11 veins, but the families in which this obtains are so few and either not represented in our fauna at all, or are so peculiar in other respects, that there is scarcely a need to refer to venation at all.

In the secondaries the range of variation is greater. In the aberrant *Hepialidae* they are similar in venation to the primaries and are 12 veined. In almost all other families, 8 is the normal number save that there may be two or three internal veins classed as Nos. 1a, 1b and 1c respectively. The costal thickening is always wanting; the costal vein is usually present. Sometimes the subcostal forms the margin of the wing itself. It is to be noted that the terms costal and subcostal veins have been confused, and this must be borne in mind when using the table of families and comparing descriptions of venation in other works. Rarely in both wings there is a cross vein between the subcostal and costal vein, and this is given considerable weight: occasionally the subcostal and costal veins unite near base for a short distance then separate again and form thus a narrow basal cell. This character also has been given fa-

mily value. The discal or subcostal vein usually divides at the end of the discal cell, though in at least one family (*Noctuo-bombycidae*) this is not the case. The median vein has three branches, and they run tolerably constant. There is usually a more or less distinct transverse vein closing the cell, and from some point in this, v. 5 runs to the outer margin. This vein varies greatly in distinctness, and not belonging to any of the series running to the base of the wing, it is termed the "independent". Its relative position, and its strength or entire absence have been given considerable value. This v. is always No. 5, and in order that it may be so, all the internal veins are counted as one. Of the internal or "dorsal" veins of Herrich-Schäffer there are from one to three but usually, at least in the *heterocera*, two. Rarely, in a few small aberrant groups the secondaries are provided with an accessory cell and rarely also is the discal cell divided, though often a distinct fold is traceable through it. In both wings the internal veins are usually without branches, but in some few aberrant groups they are curiously furcate. More detailed description of the various peculiarities of venation may be left until the discussion of the families, and reference is here made to the plate on which is given the venation of the normal and aberrant groups; common types being selected to enable the student to follow the description and figures in nature. The explanation of the plate will furnish any further details that may be necessary to an understanding of the table of families.

It may be added only that some families are furnished with a spine at the base of secondaries, termed the *frenulum*, and the presence or absence of this is accorded family value.

Mr. Hulst at p. 20 ante, has discussed this organ as it appears in the *Catocalae* and to that article I refer the student.

(To be continued.)

MISCELLANEOUS NOTES.

Notes on the habits of Cicindelidae.

The species found in Salina, Co., Kansas, are as follows:

Tetracha virginica, L. Common, appears from 1st of July to September, apparently does not have holes of its own, but seeks shelter wherever it can crawl into a crevice. I have taken them quite numerously by overturning cakes of dried mud on the banks of small ponds: it is crepuscular.

C. Belfragei, Salle. This species not very largely represented in collections, occurs from the middle of July to the middle of September. It is very peculiar in its habits. I first took a specimen July 6th, 1883, while mowing grass. Something clogged the sickle, and I got off to look after it, when a beetle darted from under the fallen swath into the standing grass. I gave pursuit, and in a few minutes had the first specimen of *C. Belfragei* in my collecting bottle. A few days afterward in company with my friend, Mr. Warren Knaus, we put in an afternoon collecting in the meadow. We walked up and down the field, fairly melted with the sultry heat, for two or three hours with no success, when at last, about four o'clock, I caught sight of one darting across the road a few feet ahead of us, and during the next hour we captured five specimens. They are rarely found during the heat of the day, but like the *Tetracha*, are crepuscular. I am satisfied that they have no burrows of their own as I have taken several specimens by overturning hay cocks. And I have never taken them at an altitude of fifty feet above the Smoky hill river bottom.

C. scutellaris, Say. Occurs abundantly in limited localities in sandy ravines among hills during May and June.

C. purpurea, Oliv. Common here, is probably too well known to all Coleopterists to need any description of its habits.

Var. *Audubonii*, Léc., is found in the same localities as *C. purpurea*.

Var. *splendida*, Hentz. The earliest species found in the spring; I took two specimens Feb. 28th, 1883. This variety is notable for its great variation in markings. I have several times observed them with a large bug, (*Lygaeus trivittatus*), in their mandibles.

C. venusta, Lec. Rare, taken in company with *S. scutellaris* in the same season.

C. vulgaris, Say. Is found occasionally on sandbars in the river.

C. repanda, Dej. Abundant in same localities as the last.

C. 12 guttata, Dej. Frequent; prefers very wet and muddy spots on sandbars, and I have several times observed them swimming across small pools.

C. punctulata, Oliv. Abundant everywhere from July 1st to the middle of September, at all times of day, from daylight until dark and occasionally they fly to a light at night.

C. lepida. Rare, solitary; occurs only in localities where salt exists to some extent. When approached they fly directly up in the air and then fly over your head and alight behind you; whether they invariably fly in this manner I will not say, but all that I have taken here have done so

ALFRED W. JONES.

* * *

Mr. Ottomar Reinecke sends a slip from his paper, the "Buffalo Freie Presse" of Aug. 12, 1884, recording an invasion of *Phytonomus opimus*, Lec., said to be an imported species; a free translation of which is as follows. Last season the writer received specimens of this species from Rochester and during the past two weeks the beetles, favored by the prevalent east winds, have appeared in immense numbers. During the last few days pedestrians may have noticed mud colored pellets moving on the pavement. This closely examined proved to be the *Curculio* above named. Thousands were trodden under foot and destroyed. Many were carried by the wind into the lake, and not a few met their death in this uncongenial element. However, the beetles have the power of closing their stigmata and remaining in an apparently lifeless condition for some time. At date the shores of the lake are covered with millions of the beetles. Cast up, they soon recover from the effects of their involuntary bath, and hastening to the nearest clover fields fulfill their life mission—i.e. deposit eggs—and then die. The egg transforms into a footless grub living in stems and roots of clover and causes enormous damage, as may be witnessed at present by thousands of acres of burnt vegetation in the vicinity of Rome, Utica and Syracuse.

How to combat this pest is another problem for the farmer—or the economic Entomologist.

* * *

Allorhina nitida was common through the Carolinas and Georgia attacking the shade trees. Near Raleigh on avenue of Walnuts was specially infested. They appeared to bite through the bark making a hole $\frac{1}{8}$ inch wide and $\frac{1}{2}$ to $\frac{3}{4}$ long. The bark seemed to be softened with some exudation from the mouth. Most of the cuts I examined reached only to the wood, but a few were much deeper. In the deeper holes I found *Cryptarcha ampla* curled up.

Trichius delta was abundant in North Carolina upon a species of *Achillia*. I found only one specimen of *Trichius affinis* in its company.

Brachys tessellata was remarkably abundant on scrub oak at Manly, N. C. Manly is a village in the heart of the turpentine district occupying a clearing in the pine forests. The oaks have sprung up wherever the pines have been destroyed by being cut for their sap. The species seemed to be very local and I did not find a single specimen elsewhere.*

I captured one specimen of *Tetracha virginica* at Cheraw in a rather curious way. It had rained heavily during the day and the streets were rivers. I was picking my way to the depot when I saw this specimen running quite frantically about the roots of an old oak. It is said to be nocturnal in habits and had been drowned out of some hiding place.

Elaphrus ruscarius I found in numbers on Staten Island this spring. A new railroad has been projected and carried as far as grading the track which at a point about a mile from Richmond runs through the woods. The *Elaphrus* were sunning themselves on this track. Many good things were taken in the trees cut down; among them several *Cucujes clavipes*.

Epicauta convulvuli and *E. strigosa* were very abundant near Sanford, N. C., on a wild *Convulvulus*. I did not find either elsewhere. Near Charlotte I found a few specimens of *Rhyssomatus lineaticollis* upon it. All of these were eating the flower itself.

In a patch of woods known as "Blood root Valley", last winter several specimens of *Cymindis americanus* were taken for the first time on Staten Island; *Pterostichus superciliosus* was also taken; one specimen.

CHAS. W. LENG.

* * *

During the latter part of July and early in August I collected at Manchester, Vt.; but with scarcely half my usual success. Lepidoptera could scarcely be found at all during the day, so Coleoptera only were sought. Beating and sweeping proved so unproductive that they were abandoned in disgust. Search in decayed logs yielded a few specimens of *Atemelus cavus* in an ant's nest. The majority of specimens were found at one point in the nest in a comparatively solid portion of the log, and near to the midst of the colony.

* In precisely similar situations on Cape Cod, many hundreds of *B. ovata* and *B. aerea* were taken. J. B. S.

Collecting dung and water beetles proved most productive. A pail of water was taken into the pasture, and a likely dropping being selected it was deposited into the pail by means of a shovel. Immediately the inhabitants began to desert their homes and swim off for dear life—only to find death in the Alcohol bottle—365 specimens were taken from a single moderate sized dropping, and many escaped. *Aphodius fimetarius* were not counted and certainly numbered nearly 100. Several species of *Aphodius* were taken: *Dialytes*, *Ataenius* and several other *coprophagus* genera had a fair representation, white *Staphylinidae* were taken in immense numbers and considerable variety. *Aphodius fossor* was moderately plentiful but seemed very local, found in a single lane only, and only in one portion of that lane. Many small species new to my collection, and not generally represented in collections where taken in numbers.

I noted also that droppings not more than 24 hours old were most productive. If older everything was gone; if much fresher little except *fimetarius* was found.

Stenus is known to be subaquatic in its habits and I found it in the muck with *Philhydrus*. I also found it in the water net after dragging aquatic vegetation. Every netful would contain a lot of frog spawn which was at first cast aside; noticing a specimen of *Stenus* half imbedded in one mass, further attention to the matter developed quite a number of specimens, apparently two or more distinct species, entirely imbedded in the masses of spawn brought up from the bottom. I do not recollect ever seeing this noted anywhere.

Afterward in searching running streams for *Elmidae* I met unexpected success in discovering *Parnidae*. Examining chips I found a few specimens of a *Helichus* and turning over a stone in an eddy, I found one or two two crawling on the bottom after the sand settled. Appropriating them I was about to turn away when I saw another, and one by one rather more than a dozen were taken from the same spot.

I found that anywhere I turned a stone and made a small cavity, *Helichus* would somehow appear in some numbers and continue to appear until I got tired picking them out.

Aquatic Coleoptera were also taken in numbers, and in (to me) a somewhat unusual manner. In a swampy portion of the meadow I started to clean out a spring hole. Taking out a handful of muck, I observed floating on the water a few beetles. They were annexed, and

more muck removed with the same result. For two hours or longer I continued this, finding the beetles imbedded in the soft mud around the roots of grasses. *Hydrophilus*, *Philhydrus*, *Hydrobius* and *Cercyon* were principally represented, though an occasional *Dytiscid* was found. Quite a large number of *Hydrophilidae* were taken, including *Helophorus* and *Hydrochus*.

C. H. ROBERTS.

Editorial Notes.

In this number we give a few extracts from the note books of collectors and some brief extracts from correspondence. Everywhere the season has been bad for collecting, and this has been our experience. Cold and wet weather seems to have been general in the Eastern and Middle States, and in consequence, comparatively little has been found. Seashore collecting else very productive, has this season yielded scarcely anything. Beating and sweeping was never so unproductive, while sugaring for moths was a discouraging task.

From Lt. T. L. Casey we have a Revision of the *Cucujidae* of N. A. (Tr. A. E. Soc. XI, pp. 69—112. Plates IV—VIII.) Lt. Casey is a new worker in the field, and if his future papers show the same thoroughness and conscientious research which characterizes this, coleopterists may congratulate themselves on such an accession to the ranks of active workers.

From Dr. Horn we have "Notes on the species of *Anomala* inhabiting the United States" (Tr. A. E. Soc. XI, 157—164) and "Synopsis of the United States species of *Notaxus* and *Mecynotarsus*" (ibid pp. 165—176). It may suffice to say that these papers are fully up to the Doctor's high standard.

It is an unfortunate and well known fact that Entomological journals never pay. The Bulletin is no exception to the rule, but we are anxious to make the subscriptions go as far as possible. Will those of our subscribers who have not yet sent in their subscriptions please do so at an early date? Our expenses have been exceptionally heavy thus far, and every dollar helps pay the printer.

From Lt. Casey we have another paper "Contributions to the Descriptive and Systematic Coleopterology of North America" (Part I with 1 Plate. Published Phil., Aug. 1884). This forms a pamphlet of 60 pages, in which are described rather more than sixty new species; and three new genera (1 *Carabid*, 2 *Staphylinid*). There are synoptic tables of *Eucesthetus* and *Elaphus*. The new species described are of all families. A valuable feature is the distinction of the species of *Tachnosterna* usually confused under the term *fusca* in collections. A goodly number of *carabidae* are described among which, we are sorry to say, several in

genera not yet studied. New species of *Harpalus*, *Anara*, *Bembidium*, *Tachys*, etc., add only new names to our list and nothing to our knowledge. A remarkable feature is the separation of *Harpalus viridiæneus* into five distinct species. As the pamphlet is a fugitive publication and not accessible to the mass of Coleopterists we reproduce the table separating the species. Of course the table applies only to those metallic green specimens that run as *viridiæneus* in collections.

Epistoma bearing two closely approximate and unequal setigerous punctures at each anterior angle; also two, more widely separated, in the middle, nearly on a line with the pairs at the angle *viridiæneus*.

Epistoma bearing two closely approximate and nearly equal setigerous punctures at each anterior angle, and in addition, two rather more distant punctures in the middle and near the posterior margin *convictor*.

Epistoma bearing two closely approximate setigerous punctures at each anterior angle *canonicus*.

Epistoma having but one setigerous puncture at each anterior angle.

Larger species. Head large; elytra wider than thorax *lustralis*.

Smaller species. Head smaller; elytra as wide as prothorax *ænescens*.

We are not quite certain that this separation without a study of allied species or of all the species of the genus is advisable. We have hitherto refrained from attempting to separate the large number of specimens we have as *viridiæneus*, fearing that on the same basis we may discover even more species. However, very little is known of *Harpalus*, and Lt. Casey may be entirely warranted in his conclusions.

* * *

Not strictly Entomological, but interesting to all students of nature are some recent issues of the "Humboldt Library" the aim of which is to bring standard scientific literature within the reach of those whose length, or a more correctly shortness of purse, does not enable them to purchase the ordinary editions. Of the works recently issued are to be recommended Bates, Naturalist on the River Amazon; and Darwin, Origin of Species.

The publishers deserve hearty support in their very laudable effort thus to bring such literature within the reach of all.

* * *

Transactions No. 5, of the Ottawa Field Naturalists Club, is at hand, and is a pleasant surprise. The matter contained in it is quite as valuable as that contained in many volumes with more pretentious titles. Of interest for Entomologists is a list of Ottawa Coleoptera. Local lists are always of value, and especially to the systematist in generalizations of geographical distribution. This list is compiled by Mr. W. H. Harrington and shows that gentleman to be a careful collector, and a close observer. We regret that other orders are only very generally touched upon. Why will students rush into *Coleoptera* and *Lepidoptera* when such wide unworked fields exist in other orders, *Diptera* and *Hemiptera* especially.

An introduction to a classification of the N. A. LEPIDOPTERA.

(Continued from p. 74.)

It has been suggested that not all students understand the use of a tabular synopsis such as the following; a few words of explanation may not be out of place therefore.

Suppose an unknown moth to come to hand; to ascertain its family, reference is had to the table. The first character made use of is the number of veins. If your insect has 12 in each wing it of course is a *Hepialid*. If the wings are tolerably equal, and more than 8 veined, you find the number 24 at the end of the line containing that character. That reference is to a similar number beginning a line, and turning to No. 24 we find only a single family under it, and to that your insect must belong. Assume however that you find "Wings not equal, secondaries with no more than 8 veins."—2. Refer to 2, beginning a line, and you find the antenna used to separate the other families into three groups. Suppose the antennæ are not clavate or clubbed at tip. The reference then is to 3. Turning to 3 we find that the number of dorsal or internal veins forms the next character. Assume that the primaries have but a single internal vein; the reference then is to 6. Turning to 6 we find the presence of an oblique connecting vein to be used. Assume the insect has none, and you are referred to 9. At 9 the *microlepidoptera* are isolated. Assume that your insect has but two internal or dorsal veins: the reference is to 10. At 10 the presence or absence of the frenulum becomes important. Assume its presence, and the reference is to 14. At 14 the question of whether or no the dorsal vein of primaries is furcate toward base, arises, and finding that it is, the reference is to 15. At 15 the presence or absence of ocelli becomes important. Assume them present, and the reference is to 20. At 20 the subcostal vein of secondaries must be examined. Assume it free, and the reference is to 21. Now the position of vein 7 of secondaries determines the family to which your insect belongs. Does it arise from, or before the end of the cell? If the former, it is a *Noctuid*, if the latter, a *Cymatophorid* (*Noctuo bombycid*).

I have been thus full in explaining how the table should be used because I have found many who did not well understand the system, which is yet so simple, precise and essentially complete.

SYNOPSIS OF FAMILIES,

after Herrich-Schäffer.

- 1 All the wings of equal structure, secondaries a little smaller, with 12 veins; an accessory cell between veins 4 and 5. 9 and 10 out of a common stalk out of the costal next to the root: a vertical branch to the anterior margin, no ocelli. no frenelum..... **Epialoidae.**
 Wings not equal, secondaries with no more than eight veins.....2
 Wings nearly equal, all wings with more than 8 veins.....24
 Wings divided or split.....25
- 2 Antennæ clavate; no ocelli, no frenelum, median cell not divided.....**Rhopalocera.**
 Antennæ clavate; with sharp acute point; ocelli; frenelum; divided median cell.....**Castniaria.**
 Antennæ bristle form, (setaceous) rarely filiform and seldom thickened before the tip.....3
- 3 Primaries without dorsal vein; no ocelli; secondaries with costal vein forming margin of wing.....**Sesioidae.**
 Primaries with 2, secondaries with 3 dorsal veins.....4
 Primaries with 2 dorsal veins which are connected; the anterior bends backward and sends out several branches; all wings with accessory cell....**Oecetecina.**
 Primaries with one dorsal vein, from the middle of which arises a branch which bends backward no accessory cell.....**Animulina.**
 Primaries with a dorsal vein, which forms toward inner margin a long fork....**Psychina.**
 Primaries with two dorsal veins; out of the inner, 2 or more veins to the inner margin: secondaries with 7 separate veins; the 8th out of the subcostal....**Megalopygina.**
 Primaries with a single simple dorsal vein.....6
- 4 Secondaries without costal vein; last branch of subcostal out of the apex of middle cell.....**Pyromorphina.**
 Secondaries as before: with an oblique branch between costal and subcostal veins.....5
 Secondaries with costal vein, free, or very close to the root; without cross vein, connected with subcostal or arising out of it; no ocelli.....**Cossina b.**
 Secondaries with costal and subcostal veins free; middle cell of the primaries not divided....**Heterogynina.**
- 5 Ocelli present.....**Zygaenoidae.**
 Ocelli wanting.....**Cossina a.**
- 6 Secondaries with an oblique connecting branch between costal and subcostal arising behind the middle.....7
 Secondaries without this connecting branch.....9
- 7 Dorsal vein of the primaries divided towards the base.....**Sphingina.**
 Dorsal vein not furcate; no frenelum.....8
8. V. 5 of each wing from the same point with 4. Primaries with 11 veins.....**Endromioidea.**
 V. 5 of secondaries nearer 6 than 4. Primaries with 12 veins....**Lasiocampa.**

9	Secondaries large, never lanceolate, with one or two free inner veins.....	10
	Secondaries lanceolate; with three dorsal veins; or with venation obsolete.....	
	Microlepidoptera.	
10	Secondaries without frenelum.....	11
	Secondaries with frenelum.....	14
11	Dorsal vein of primaries not furcate toward root.....	12
	Dorsal vein of primaries not furcate toward root, vein 5 of secondaries nearer to 6 than to 4.....	13
12	Primaries without accessory cell.....	Bombycoidea.
	Primaries with accessory cell giving rise to veins 7-10.....	Cilicina.
13	Tongue wanting.....	Saturniina.
	Tongue strong.....	Uranidae.
14	Dorsal vein of primaries furcate toward root.....	15
	Dorsal vein of primaries not furcate.....	22
15	Ocelli wanting.....	16
	Ocelli present.....	20
16	Costal vein of secondaries arises from subcostal.....	Phytometrinae.
	Costal vein from root, or very near base.....	17
17	V. 5 of secondaries weak, or wanting.....	Dendrometrinae a.
	V. 5 of secondaries equally strong.....	18
18	Femora closely scaled.....	Dendrometrinae b.
	Femora with long hair.....	19
19	V. 6 and 7 of secondaries independent.....	Drepanulinae.
	V. 6 and 7 of secondaries from same stalk.....	Notodontina.
20	Costal vein of secondaries free.....	21
	V. 8 of secondaries from subcostal.....	Nycteolina.
21	V. 7 of secondaries from subcostal before the end of the cell.....	Cymatophorinae.
	V. 7 of secondaries from end of cell.....	Noctuina.
25	Secondaries with costal vein.....	23
	Secondaries without costal vein.....	Syntomoidea.
23	Ocelli wanting.....	Lithosinae and Liparidinae.
	Ocelli present.....	Arctioidea.
24	Ocelli present.....	Micropteryginae.
25	Secondaries divided into 3 parts.....	Pterophorina.
	Each wing divided into 6 nearly equal feathers.....	Alucitina.

I wish again to call attention to the fact that the preceding table is not exactly accurate, as applied to our fauna, but it is so far correct that all save a few aberrant forms can be correctly referred, by its means. In the next paper will begin the description of the various groups above enumerated.

(To be continued).

Notes on the food-habits of some N. A. Rhynchophora.

BY E. A. SCHWARZ.

Panscopus erinaceus Say, occurred abundantly last July in the mountainous regions of Virginia on wild Grape-vines, feeding on the foliage and young buds.

Eudiagogus. The food-plants of our two species are the Coffee-weeds (*Cassia occidentalis* and *C. obtusifolia*, and probably also other species of this genus). *E. pulcher* is much more abundant and more widely distributed than *Rosenscholdi* and sometimes defoliates large tracts of these troublesome weeds.

Pachytychius discoideus Lec., breeds in the flower heads of *Helenium tenuifolium*.

Anthonomus gularis Lec.; oviposits in the blossoms of *Cassia marilandica* in the middle of August, the larvæ developing in the pods of the plant.

Anthonomus flavicornis Boh. I found this inquilinous in a globular Acarid gall on the leaves of *Solanum eleagnifolium* at Columbus, Texas.

Rhyssomatus lineaticollis Say. Larvæ and pupæ were found in the seed pods of *Asclepias tuberosa* at Detroit, Mich., toward the end of August. There are usually only two or three, rarely more, larvæ within the same pod, and they destroy only a small portion of the seeds.

Himatium errans Lec., is inquilinous in the galleries of *Tomicus cacographus* under bark of Yellow Pine. It occurred abundantly at Tallahassee, Fla., in April.

Hypothenemus eruditus Westw. (*hispidulus* Lec.), infests not only dry twigs of all sorts of deciduous trees, shrubs and woody plants, but also old cotton bolls, dried up figs, pomegranates and other fruits. In consequence of this diversity in food-habits the beetle exhibits considerable variation in size, shape and sculpture. I have seen specimens from the Bahama Islands, Jamaica and Brazil. Not rarely specimens occur in which the head is protruded and thus apparently not covered by the prothorax. Upon such specimens Mr. Eichhoff seems to have established his genus *Stephanoderes*.

Micracis rudis Lec., bores under the bark of the larger twigs of Hackberry (*Celtis*). It is a rare species and I always found only single specimens. Occurs in Michigan, Texas and Georgia.

Micracis opacicollis Lec. Very abundant at Washington, D. C., in small oak twigs which have been affected by a Cynipidous stem-gall.

There are sometimes more than 50 specimens in a single twig of three or four inches in length. The beetle may be found at all seasons and there are at last three annual generations.

Scolytus muticus, Say. I found this rare species in August under bark of *Celtis* at Washington, D. C., and at Columbus, Tex. At the latter place it occurred in company with *S. fagi*, Walsh, which is, however, much more abundant and greatly destructive to the Hackberry.

Chramesus Chapuisii, Lec. I obtained this from twigs of the Pecan nut. (*Carya olivæformis*) at Columbus, Tex.

Phloeotribus frontalis, Fabr., breeds in large numbers in small twigs of Hackberry and also bores under the bark of the large limbs of the same tree.

Cnesinus strigicollis, Lec. Cut from dry wigs of a *Bumelia* at Columbus, Tex. Near Washington, D. C., it is not rarely found on twigs of freshly felled Oak shrubs.

Brachytarsus limbatus, Say. I raised this species abundantly from the flower heads of *Helenium tenuifolium* at Selma, Ala. From the same plant I obtained *B. vestitus* at Columbus, Tex.

Brachytarsus variegatus, Say; breeds in the smut of corn.

Choragus Sayi, Lec. I cut several specimens near Washington, D. C., from thin, dead beech twigs which were infested with fungus growth.

Euxenus piceus, Lec. This, the smallest of our Rhynchophora, is found abundantly in Florida on dry Palmetto leaves, its larva living, in all probability, in the ribs of the leaf. Several specimens of an undescribed species of *Xenorchestes* were found under the same conditions by Mr. H. G. Hubbard in southeastern Florida.

ABSTRACT of the PROCEEDINGS of the Entomological Club of the A. A. A. S.

The meetings of the Club were very well attended, some thirty gentlemen and ladies having been present; among them some of our best known entomologists. A feature of the meeting was the presence of Dr. Jno. G. Morris well known to all Entomologists as one of the pioneers in American Lepidopterology; to whom we owe our first catalogue, and to whose efforts we owe also the first attempt at systematizing our lepidopterous fauna. It will no doubt be a pleasure to our readers

to learn, that Dr. Morris has announced his intention of returning to his first love—Entomology, and we doubt not he will be hailed with sincere pleasure by the new generation of Entomologists who have hitherto known him so favorably by what he has already done.

Sept. 3d. Officers elected. John G. Morris of Baltimore, Presid.; Herbert Osborn of Ames, Ia., Vice-Presid.; John B. Smith of Brooklyn, Secretary.

Dr. Horn called attention to the historical associations connected with the place in which the club then met. On that very spot in the old museum of Natural History, Thomas Say, poor in pocket, though rich in brain, put up his bed under the skeleton of some large mammal, and this for months was his only home. There also he contracted the illness which resulted in his death.

A paper from D. S. Kellicott, "On the ovipositing apparatus of *Nonagria subcarnea*" was read by the Secretary.

The last two abdominal segments of the ♀ are strangely modified. The last is laterally broad, chitinous except at base, terminating in two finger like processes; these are connected at the apices and curve downward. Two concave discs lead to the anal orifice; it is evidently along this channel that the eggs are passed by the ovipositor. On either side, and below the groove is a strong chitinous ridge with saw like teeth, pointed backward. The other modified ring consists of a heavy band with stout posterior processes for muscular attachment; below are two stout chisels pointing backward and overlapping the first basal teeth of the "saws" of the last ring.

The eggs are laid near the edge of the leaf in a row, and the leaf is then bent over the eggs, carefully cemented down, and a perfect tube thus formed. The manner in which this is done has not been witnessed.

The imago has a very peculiar and very prominent pointed clypeal projection, of use probably in enabling it to pierce the stems of the *Typha* in which it lives during the arval period and undergoes its transformation.

Mr. Smith cited the presence of similar modifications in other groups of the Noctuidæ.

Mr. John B. Smith exhibited six large photographic plates of *Agrotis* and gave a review of the remarkable range of variation in structure found in the genus. Much greater than in many recognized genera.

In response to a question from Dr. Morris, Mr. Smith said that in the *Noctuidae* genera were undoubtedly based upon very thin characters—less so than in *Coleoptera* however.

Dr. Horn said it was long since laid down by Lacordaire that characters of scarcely specific value in one group formed excellent bases for high divisions in others; genera have no existence in nature and are created only for convenience in dividing up large masses of species to facilitate recognition. Nature has species only. Of late however, persons afflicted with the *mihi* itch, finding new species scarce had taken to describing genera. For 12,000 species of *Coleoptera* some 2000 genera had been described.

Dr. McCook says in the spiders and ants there is plenty of room for persons with the *mihi* itch, as there is a very large mass of undescribed material.

Mr. B. P. Mann then proposed a combination of the Entomological journals of America to be published by a stock company and to combine the good features of each. This proposition provoked much discussion and while the general sentiment was in favor of such a publication the opinions also went generally to the point that it would be still less likely to pay than those now existing. The Am. Entom. Soc. is wealthy enough to publish everything in the way of long systematic papers presented to it, and the "Transactions" would be the natural avenue for such works. The Bull. Bkln. Ent. Soc. covered another ground in the way of reducing to its simplest and most comprehensive form the knowledge of Coleoptera and Lepidoptera: often as, Dr. Horn stated, publishing the result of two weeks hard work, on less than two pages. It was also published and supported by a Society willing and able to support it. The Can. Ent. was supported by govt aid. "Papilio" was established merely to enable certain authors to get into print more rapidly than they could otherwise do, and its editor announced that he saw no reason for its continued existence.

"Psyche" has a hard struggle for existence, but will not suspend just yet.

A committee was appointed to consider whether such a combination was advisable, and whether and how it could be supported.

This committee afterward reported adversely to any such scheme.

Prof. Fernald then proposed a series of very interesting questions provoking considerable discussion, and on these questions he would like the opinion of all who may have considered them.

1. Where a name has once been published by an author, shall we change the mode of spelling to one more consistent with its derivation; e.g. Treitschke writes *Cochylis*, probably by mistake; shall we adopt his spelling or the more correct *Conchylis*?

Dr. Horn says no; some authors merely put together a lot of letters without any meaning whatever and called them genera. If such barbarisms were accepted we should not stir a name as originally spelled by the author. Mr. Mann agreed with Dr. Horn. Dr. McCook thought we might make the change; but not if thereby the author's right to priority would be destroyed.

2. Where an author publishes a name manifestly incorrect in orthography, and in a later work corrects his own error, shall we adopt his correction?

The sentiment was that when the correction was made within a reasonable time and before the incorrect form had come into general use, it should be adopted.

3. Should the termination of the specific name be made to agree with the generic in gender? e.g. Zeller writes *Tortrix viridana*; *Exartema permundanum*; *Lophoderus ministranus*. Shall this rule be adopted, or shall we adopt the ending in *ana* irrespective of the gender of the genus?

Dr. Horn says in Coleoptera specific and generic names always agree in gender; where however a termination means something, i.e. indicates the family to which an insect belongs, he would use the uniform terminations. Mr. Mann does not believe in uniform terminations and while he would not change existing names, neither would he consider himself bound to uniform terminations in proposing new ones.

4. Where a *Tortricid* species is described with a name not ending in *ana* should this be changed to *ana*? e.g. *Carpocapsa pomonella*? Prof. Fernald himself was adverse to such change, and no one disagreed with him.

5. To what extent should the law of priority be made use of? Shall we make use of the oldest name even if the species has been known under another for a long time? If not, for how long a time must a name universally or generally be in use to take precedence over an older name?

The sentiment of the meeting was that discussion of this question would be useless, as no conclusion even if reached would be respected.

6. What should be taken as the starting point in nomenclature; some have taken the 12th edition of Lin. Syst. Nat. while others have taken the 10th edition?

No decided opinions were elicited though preferences were stated.

Prof. Fernald expressed surprise that Hübner's Verzeichniss genera should be so generally ignored, though they were after a fashion described, while Guenee's genera of micros proposed in the Index methodicus, though not sanctioned by one word of description were universally adopted.

Dr. Horn thought the case might be parallel to that of Erichson and Motschulsky both of whom had proposed some generic terms and had not described them; but while Erichson's genera were all adopted because they always were well founded, Motschulsky's were as uniformly ignored because usually unfounded.

Mr. Smith said as to *Noctuidae* the parallel would hold. Prof. Fernald said, not so of *Tortricidae*; Guenee has just as many baseless genera as Hübner has,

Sept. 4th —On this occasion the meeting was held at the Acad. of N. Sc. in the rooms of the Am. Ent. Soc. Mr. J. H. Emerton exhibited a large number of his types of spiders recently described by him, and the collections of the Society were open.

Mr. Smith gave an account of the secondary sexual characters of some Lepidoptera, notably *Noctuidae* and *Deltoidae*, illustrated by black-board sketches. In the *Deltoids* these characters are most aberrant; in the *Hermiinae* the anterior coxa is slender, much elongated, the femur a mere shell, furnished with a dense tuft of long hair; the tibia is more or less aborted, and modified into a flattened plate, also furnished with a large tuft. The first tarsal joint which is usually mistaken for the tibia is greatly elongated and is inserted into the tibia near to the base. In *Palthis* the tibia is very short, and the tarsi developed to an enormous extent. In addition the ♂ *Palthis* has a very long tuft of hair on the terminal joint of palpi. Various antennal peculiarities were noted. *Renia* has a strongly bent joint at basal third, from the base of which proceeds an articulated appendage fringed with hair. *Zanclognatha* has a different bend and lacks the articulated appendage. The modification in the ♂ of *Heliothis paradoxus* and other forms with pellucid spots on primaries was discussed, and the questions raised: what purpose do they serve? what value shall they have in classification?

Prof. Fernald says, in the *Tortricidae*, generic and even higher value had been accorded these characters. A prominent one in this family was the costal fold which sometimes extends two-thirds across the wing.

Dr. Horn says both sexes must be considered in characterizing a species; a species consists of two separate individuals which must be studied as one: synoptic work has a higher aim than the mere recognition of species.

Dr. Macloskie called attention to some sexual differences in birds; the flickers of the East and West were widely different: in intermediate points intermediate forms were found and the ♀s were almost indistinguishable. Yet they were distinct, and though no anatomical differences could be found there must be a physiological difference.

Mr. Osborn read a paper on *Mallophaga* and *Pediculidae**, calling attention to the correspondence of identical or very similar species on the closely related birds and mammals of Europe and America, citing a large number of instances.

Miss Cora H. Clarke gave an account of the habits of some Caddis fly-larvæ belonging to *Hydropsyche* and *Plectrocnemia*, exhibiting specimens of their work.

Mr. Mann explained how Prof. Barnard raised larva living in running water; he confined them in a glass tube, one end closed by a porous substance, the other fastened to a faucet. In this way a steady flow of water of any desired strength can be kept up.

Dr. Morris exhibited a gall recently collected and asked information concerning its identity. Asked also what orders of insects are known to produce galls. Mr. Osborn said about all orders except *Orthoptera* and *Neuroptera*. Mr. Smith said at last one American *Apionid* was known as a true gall producer, while several European species formed root galls.

Mr. Mann said in Bibliographical work he had found great difficulty in indexing galls; he had among others indexed them under descriptive botany.

Mr. Osborn said while many plants, especially the *Rosacea* were subject to galls yet they were produced by insects and are abnormal so far as the plants are concerned; almost every species of insect produces a peculiar gall of its own.

* Families of parasitic *Hemiptera* which infest man and some of the lower animals.

Dr. Hoy said galls were pathological appearances and rather diseases of plants; as much out of place in descriptive botany as a description of cancer in a description of the lips.

Dr. Morris remarked on the scarcity of larva and imagines of Lepidoptera, which produced much discussion, and showed that while northward there had been no unusual dearth of insects, elsewhere all insects had been remarkably rare. *Cardui* was an exception and generally common. Mr. Aaron cited a remark of Mr. Ridings that he was always afraid of a season when *cardui* was abundant, for then, usually, nothing else would be found.

Dr. Hoy remarked that in his locality (Racine, Wisc.) he had found many insects usually more southern, and started a discussion upon the range of *P. turnus*.

The question then turned upon the food plants of *P. ajax*. Dr. Hoy said the pawpaw was not found within 200 miles of Racine, while *ajax* had often been found, still fresh and not fully developed.

Mr. Aaron gave spice wood and upland huckleberry as further food plants. Dr. Hoy said they had the huckleberry but not the spice bush.

Mr. Osborn had seen *ajax* but knew of neither huckleberry, pawpaw or spice bush in the vicinity of Ames, Ia., of the spice wood he was not sure—they might have it. He reports from Sioux City, that there *Chrysochus auratus* is so common, that it is crushed under foot in the streets. Mr. Mann has seen them in woods in piles upon stones.

Mr. Saunders reports an abundance of *H. textor* everywhere through Canada, and from West Canada an invasion of the larva of *Grapta progne* on currants.

Mr. Gräf exhibited some specimens of Lepidoptera, rare or typical of recently described forms.

Sept. 8th.—Prof. Martin exhibited some specimens of gum copal containing imbedded insects, all of which appeared to be of a post tertiary type. The gum is obtained near the equator, some distance from the shore, by digging at the site of old forests, long since extinct, the gum being the product of such trees. Among the Coleoptera Dr. Horn recognized a form allied to *Callida*, 2 *Chrysomelids*, 1 *Clerus*, 1 *Cymatodera*, 2 *Longicorns* near *Clytus* and *Leptura* and an Elaterid much like one of our species of *Cardiophorus*. Mr. Smith recognized one of the *Lepidoptera* as a *Mamestra*, and the *Hemiptera* as representing common living types, one Homopterous species remarkably like a form now common and in the *Diptera* a common *Muscid* type.

Prof. Lintner gave the results of some observations on injurious insects. *Orgyia leucostigma* was very rare in Albany. Mr. Dimmock found the same in Boston. Mr. Hulst the same on L. I. and Mr. Smith the exact contrary at Cape Cod, Mass.

From Michigan the larva of *Agrotis fennica* is reported as so abundant that it is called the black army worm. Usually this is a rare insect. *Podisus cynica* has been observed destroying the currant worm in numbers. *Lygus linearis* is injurious to green peas, stinging and blotching them. *Poecilopsus lineatus* has seriously injured gooseberries, stinging the branches and thus causing their death.

Phytonomus punctatus has spread westward and attacked beans; a new habit for this insect. *Crioceris asparagi* has moved west as far as Geneva, N. J.; heretofore it has been confined to the coast districts. *Galerucella xanthomelaena* has been very destructive to elms. A vast number of specimens of *Otiorynchus ligneus* were found in a house which had been closed for four years. What had they fed on? There was nothing in the house, and one of the natural articles of food is the strawberry root.

A curious seed, (*Euphorbia*, probably) from Mexico was exhibited, locally known as the "jumping seeds". The peculiarity consists of a series of erratic movements and leaps made by the apparently perfect seed. They contain however a larva of *Carpocapsa saltans*, and it is the motions of this insect which cause the movements of the seeds; why they make these motions is unknown. The species closely resembles *C. pomonella* but has very differently formed legs the tarsi being hidden by long scaly tufts.

Dr. Horn calls attention to the fact that all the injurious Coleoptera cited by Mr. Lintner were imported species and that the fact of their motion westward along the line of their food plant was to be expected. *Crioceris 12 punctata*, also an imported species, has been taken near Baltimore; near that city, and Alexandria many imported species are found. *Blaps mortisiga* and one other species are common; the former can be taken in some places by the bushel. Curious is the remarkable increase of some species. In 1874 when working with Dr. Leconte on the *Rhynchophora* among all their material only a single specimen of *Aramiges Fulleri* was contained and that came from Montana. A year or two after it was received from all parts of the country and was dreaded as one of the worst hot house pests. How did this species spread so suddenly over so large a territory? Prof. Lintner had first found the insect in 1876. Mr. Dimmock finds it very troublesome in hot houses, particularly on roses.

Mr. Hulst noted the appearance in large numbers of a downy insect on maple. Mr. Lintner said it was *Coccus (Pulvinaria) innumerabilis*. Prof. Osborn had noticed the same insect, and gave its life history: no less than seven species of insects are known to prey on it. Mr. Saunders has noticed it, and the larva of *Chilocorus bivulnerus* had also been so common as to attract attention and cause alarm. Mr. Underwood reports that the species is said occasionally to attack the elm.

Dr. Horn gave an account of secondary sexual characters of coleoptera comparative with Mr. Smith's account of Lepidoptera. In *Collops* the antennal modification is very like that of *Renia*, and the use of it has been observed: the ♀ antenna is grasped in the bend of that of the ♂; the articulated appendage is thrown forward, and the antenna beyond the bent joint is thrown backward, so that during copulation the ♀ is firmly held. In *Meloe* is a structure very similar to that of *Herminia* and answering a similar purpose. The palpi in *Sphalera (Tomoxia)* sometimes have an articulated appendage near tip, probably also serving as a grasping organ. These organs are explainable. Other modifications are obscure. *Lebia* for instance has a notch at the inner side of the middle tibia near tip: a species of *Aphodius* has a very curious hook to the first joint of hind tarsi: another has a peculiar clavate appendage to the inner side of fore tibia near tip.

Mr. Cresson says, that except in the parasitic forms which he has not studied, the Hymenoptera show no such peculiarities.

Mr. Osborn says that in *Mallophagidæ*, and especially in *Lipeurus*, a modification of the antenna similar to that of the *Tomoxia* palpi was found, and also undoubtedly served as a clasping organ.

A committee of three was appointed to arrange a programme and obtain papers for the next meeting of the club, which then adjourned. Committee; J. B. Smith, of Brooklyn, Chairman, and B. Pickman Mann, of Washington, and Herbert Osborn, of Ames, Iowa.

JOHN B. SMITH, Secretary.

ON PRESERVING LARVAE.

BY A. W. PUTMAN CRAMER.

Though a person may have collected and studied Lepidoptera for years and though he may be able to determine hundreds of imagines from memory, still he will in all probability be unable to give the names of more than a few dozen larvæ, and will find himself utterly at sea when

endeavoring to describe any larva from memory in such a way that it can be recognized. Even carefully written descriptions of larvæ, made from the living insect give no satisfaction at all when not accompanied by a drawing.

Some of us have made sketches or drawings of rare larvæ, but this takes up too much valuable time and few collectors can draw a recognizable picture. Others have tried to preserve the larvæ as near life-like as possible and have met with more or less success.

In the present article I have tried to describe a method which has given me during the past year much satisfaction both on account of its simplicity and effectiveness; the colors remaining nearly unchanged. It requires no costly or bulky apparatus and a little practice will enable any one to preserve his larvæ in their natural shape and color. As a rule larvæ are in the best condition to be operated upon, from three to six days after moulting. The colors are then not so easily destroyed as they are shortly after moulting or closely before pupation.

When collecting caterpillars for this purpose do not crowd them together in one box as they will invariably stain each other with their green saliva, causing dark spots on the skin, which I have thus far been unable to remove.

The best way of killing them is with cyanide, care being taken that the cyanide-bottle is perfectly dry and that the exudation of the larva when dying does not come in contact with the skin.

When dead, place the larva on a piece of paper resting on some soft material like wool, take a glass rod or tube, covered with rubber and cause the contents of the intestines to pass out through the anus by pressing the covered rod on the larva and rolling it from the middle of its back towards the claspers. While doing this the intestine will protrude to a length varying according to the size of the insect from 5 to 15 millimeters. Next place the rod close behind the head and repeat the operation, but do not endeavor to remove everything nor to exert much pressure on the larva or your green caterpillar, if you are operating on such a one, will lose its color and turn either white, yellow or brown.

Having removed the necessary part of the contents of the intestines, take the protruding alimentary canal between your fingers and insert the point of a finely drawn out glass tube, till it enters the anus two or three millimeters, then secure the intestine to the tube with a thread and make the juncture air-tight with a little collodion. All that now remains to be done is to fill the larva with air under a pressure of from 5 to 15 milli-

meters of water according to the size of the larva and then to let it dry. The drying process will generally take from one to six days.

The advantages of this process are that you need no oven or heat, that the colors do not change, that the operation takes but a few minutes and that you have great facilities to give the larva a natural position.

After the larvæ are dry they are easily removed from the tube by cutting the intestine close to the anus all around the tube. By rubbing a little soap on the point of the tube before insertion it prevents the membrane sticking to the tube. When it is merely desired to dry one or two larvæ the air pressure is most readily obtained from those red rubber balloons which are sold in all toy-stores. By fastening a short glass tube provided with a rubber tube and pinchcock in the mouth of the balloon and inflating it with air, closing the pinchcock, then attaching it to the glass tube which has been secured to the larva and opening the pinchcock the larva skin will inflate and take a more or less natural form. I generally have the drying larvæ lie on a table, and cause them to take a natural position, by propping them up or holding them down wherever desired; by hanging them up they are apt to elongate too much.

Where it is desired to dry several larvæ a small gas holder can be used advantageously, though the following apparatus is as satisfactory as to results and can be readily obtained. A U-shaped tube made of tin or iron tubing from 7 to 10 centimeters in diameter, the legs being each about 60 centimeters long, is open at one end and connects at the other to a series of small T-shaped tubes of about 4 millimeters bore, each ending in a short piece of rubber tubing closed with a pinchcock or glass stopper. By pouring water in the open leg the air is compressed in the closed one and any desired pressure of air can be obtained, while larvæ can be attached or detached without the least trouble or any appreciable loss of pressure.

SYNOPSIS OF COLEOPTERA.

TETROPIUM, Kirby.

This genus contains two species resembling *Asemum* in general appearance but differing from it in the unequal palpi and divided eyes.

T. velutinum; Lec. Ann. Lyc. Nat. Hist. IV, 1869, 7. 382.

This species may be known by the somewhat opaque thorax with deep medial impression and strongly rounded sides, and by the fine

velvety pubescence which covers the thorax and elytra. The latter are described by Dr. Leconte as being "sometimes piceo-ferruginous at base" but in specimens under examination are of a uniform reddish brown. Length .50 to .80 inches, = 12½ to 20 mm. Habitat, Vanc., Cal., Montana.

T. cinnamopterum, Kirby. Fn. Bor. Am. IV, p. 174, t. 5, f. 8. Lec. J.A.P., ser. 2, II, 1850. p. 35.

In this species the disk of thorax is more shining, smoother and less broadly rounded at sides; and the pubescence is less marked. The elytra are dark slatey brown in color, varying to reddish brown and bear two more or less marked costæ. Length .50 inch. = 12.5 mm. Hab. N. J., Pa., abundant Lake Superior.

OPSIMUS, *Mann.*

This genus contains one species which with *Dicentrus* constitutes the group *Opsimi* distinguished from all other groups by having the thickened hind margin of the prothorax broadly emarginate in the arc of a circle and the emargination filled with a thin corneous plate. The species is

O. quadrilineatus, Mann. Bull. Mosc. 1843, II, p. 305; Esch. Dej. Cat. 3d ed. p. 354; Lec. Ent. Rep. 1857, p. 60, t. 2, f. 10.

It is a dead-colored, finely pubescent insect, having the prothorax armed with a lateral acute spine, and the disk of the elytra with several vague impressions. The palpi are unequal in length and the legs stout with strongly clavate thighs and the 1st joint of hind tarsi longer than the two following united. Length .31 to .35 inch. = 8—9 mm. Hab. Alaska, Or.

DICENTRUS, *Lec.*

In this genus the thighs are not clavate and the prothorax is armed at sides with an acute spine at base in addition to the lateral spines. The species is

D. Bluethneri, Lec. Trans. Am. Ent. Soc. VIII, p. 195.

The color of this species is piceous, and the elytra have each two large brown spots. Length .12 to .22 inch. = 3 to 5.5 mm. Habitat, California.

SMODICUM, *Lec.*

It seems useless to repeat all the group characteristics of this genus. They are fully stated in the "Classification". The single species is easily recognized by its narrow, depressed form and shining, pale yellow color. Length .3 inch. = 7.5 mm. Hab. Atlantic States to Texas.

S. cucujiforme, Say. J.A.P. V, 3, 1827, p. 277. Lec. J.A.P. ser. 2, II, 1850, p. 24; *cylindrides* Newm. Ent. Mag. V, p. 394; *melanophthalmum* Dej. Cat. 3d ed. p. 357.

CONOCALLUS, *Lec.*

This genus contains only one species:

G. collaris, Kirby. Fn. Bor. Am. IV, 1837, p. 141; Lec. J.A.P. ser. 2, II, p. 33; *lepidum* Lec. J.A.P., ser. 2, II, 1850, p. 34.

It is a slender black species with bright red prothorax and brassy elytra. The thighs are comparatively slender and the 11th joint of the antennæ in ♂ is distinctly divided, the outer portion the shorter. Length .35 inch. = 9 mm. Hab. Canada, Lake Superior.

PHYSOCNEMUM, *Lec.*

This genus is equivalent to *Dularius* Thoms. of the Crotch Check List, over which it has priority. It contains two species which have strongly clavate femora, and the elytra with humeral angles rectangular and raised lines of a pale color approaching the appearance of ivory. The species are

P. Andreae, Hald. Trans. Am. Phil. X, 1847, p. 36; Lec. J.A.P. ser. 2, II, p. 32; Dej. Cat. 3d ed. p. 355; *luscum*, Thoms. Class. Long. p. 257.

In this species the elytra are blackish, more or less red at base and apex and the ivory lines form a St. Andrews' cross. The femora are tawny in color. Length .80 inch. = 20 mm. Hab. Georgia, rare.

P. brevilineus, Say, J.A.P. III, 1823, p. 413; Hald. Trans. Am. Phil. X, p. 38; Thoms. Class. Long. p. 358; *chalybeum* Dej. Cat. 3d ed. p. 355.

The elytra are bluish black and shining, the femora are black and the ivory lines irregularly disposed. Length .50 to .75 inch. = 12.5 to 19 mm. Hab. Pa. to Kansas.

RHOPALOPUS, *Muls.*

This genus contains only one species resembling the preceding in form but differing from it by the absence of the ivory lines. It is entirely black except the thorax which is bright red and the tips of the elytra which are brownish. The thorax is obtusely angulated at sides and finely granulate as is the entire body. The legs are black and pilose with femora moderately strongly clavate. Length $\frac{5}{8}$ to $\frac{3}{4}$ inch. = 15 to 19 mm. Hab. Northern New York.

R. sanguinicollis, Horn, Proc. Ac. Nat. Sci. Phil. 1860, XII, p. 571, t. 8, f. 3.

HYLOTRUPES, *Serv.*

This genus includes three species which resemble *Phymatodes* in the rounded sides of prothorax, slightly tapering elytra and clavate femora but differing in the broad prosternum and enclosed hind coxæ. They are easily separated by their colors as follows.

Black, elytra black with grey pubescence	bajulus.
Black, elytra violet blue.....	amethystinus.
Black, elytra yellow or red with black markings.....	ligneus.

H. bajulus, Linn. Syst. Nat. ed. X, p. 396; Panz. Fn. Germ. 70, 1; &c. *caudatus* Dels.; *Linneianus* Laich; *similis* Marsh; *bullatus* Hald. Trans. Am. Phil. X, p. 36; Lec. J.A.P. ser. 2, II, p. 31; *imperfectus* Faldern; *lividus* Muls; &c.

This species is entirely black, the thorax thickly clothed with long white hair and ornamented with two smooth, strongly elevated callosities. The elytra are black, coriaceous at tip and sides and have an indistinct patch of white or gray pubescence about one-third from base with sometimes a still more indistinct patch behind this. The posterior thighs are scarcely clavate. The antennæ are very slender and short; in ♂ one-third, in ♀ one-half length of body. Length $\frac{3}{4}$ to $\frac{7}{8}$ inch. = 19 to 23 mm. Hab. United States.

H. amethystinus, Lec. Proc. Ac. Phil. VI, p. 234.

This species is black, the thorax has three indistinct smooth longitudinal elevations, and is otherwise densely punctured; the elytra are shining violet blue, finely and densely punctured; the femora are simple, neither anterior nor posterior being clavate. Length .75 inch. = 19 mm. Hab. California.

H. ligneus, Fab. Mant. Ins. I, p. 153; Oliv. Ent. IV, 70, p. 23, t. 7, f. 79; Lec. J.A.P. ser. 2, II, p. 32.

This species is very variable in color. The body is black and the thorax carries five slightly elevated callosities. The thighs are as in *bajulus* clavate except the posterior. The antennæ are longer and in the female quite strongly serrate. The normal color of the elytra is bright yellow with apical fourth and a medial spot black. The yellow is at times however nearly red and the spot is extremely variable in size and shape. Length .30 to .45 inch. = 7 to 12 mm. Habitat, Maine to California.

PHYMATODES, *Muls.*

This genus, containing many species, in addition to characters of table is distinguished from *Callidium* which the species often closely resemble, by the labial palpi being much shorter than the maxillary. The

type of the genus is *variabilis* which is so well known than an extended description is unnecessary. With the assistance of Dr. Horn we have compiled the following table:

SYNOPSIS OF PHYMATODES.

Thorax yellowish, surface metallic.

Larger species.

Thorax, elytra and legs yellow, more or less marked with blue *variabilis*.
Color fuscous. *infuscatus*.

Smaller species.

Elytra piceous..... *thoracicus*.
Elytra blue.

Antennæ all dark..... *amoenus*.

Basal joint of antennæ pale..... *blandus*.

Thorax rufous with broad black vitta..... *maculicollis*.

Thorax and elytra unicolorous.

Brown or bluish black, larger species..... *obscurus*.

Opaque brown or black, smaller species..... *ater*.

Shining black..... *aeneus*.

Thorax dark, elytra of lighter shade before the middle..... *dimidiatus*.

Thorax variable, elytra fasciate.

Elytra with one fascia..... *vulneratus*.

Elytra opaque with two fasciæ.

Fasciæ transverse..... *varius*.

Fasciæ oblique..... *decussatus*.

Elytra very shining, with two fasciæ..... *nitidus*.

P. *variabilis*, Linn. Fr. Suec. p. 192; Kb. Fn. Bor. Am. IV, p. 172; Costa, Fn. di Nap. II. p. 33, t. 33, f. 1—4; *testaceum* Linn. Syst. Nat. ed. X, p. 396; Oliv. Ent. IV, 79, p. 15, t. 1, f. 11; Schoenh. Syn. Ins. I, 3, p. 443; Muls. Col. Fr. ed. I, p. 50; *ventrale* Hald. Trans. Am. Phil. X, p. 37.

The coloring of this species varies greatly, it being sometimes entirely yellowish and sometimes entirely suffused with a metallic blue which reaches the thorax and tibiae. Every variety between these extremes is found. Length .52 inch. = 13 mm. Hab. United States.

P. *infuscatus*, Lec. Proc. Ac. Phil. 1859, p. 285.

This is, *fide* Dr. Horn, almost surely a synonym of *variabilis*.

P. *thoracicus*, Muls. Col. Fr. ed. I, p. 51.

The thorax varies in color somewhat, being yellowish testaceous with more or less darker blotches at sides. The elytra are uniformly piceous, in specimens before us with a faint metallic lustre. The ♂ antennæ are very long and filiform. Length .36 inch. = 9 mm. Hab. Canada and M. States. The species is an imported one.

P. amoenus, Say, J.A.P. III, 1823, p. 413; Lec. J.A.P. ser. 2, II, p. 33; *bicolor* Knoch. *i. litt.*

The thorax is bright yellow and the elytra metallic blue. Length .20 to .32 inch. = 5 to 8 mm. Hab. New York.

P. blandus, Lec. Proc. Ac. Phil. 1859, p. 79.

Resembles the preceding very closely, but the elytra vary to a lighter shade of blue and the basal joint of antennæ is always pale. It is also narrower than *amoenus*. Length .30 inch. = 7.5 mm. Hab. California.

P. maculicollis, Lec. Proc. Am. Phil. XVII, p. 614.

No specimens of this species are before us. We give therefore Dr. Leconte's description in full.

"Blackish, piceous, finely sparsely pubescent. Head and prothorax finely not densely punctured, the latter a little wider than long, rounded at the sides, rufous with a broad black dorsal vitta. Elytra not wider than the prothorax, densely punctured. Beneath sparsely punctulate, prothorax rufous, legs piceous, coxæ and thighs except at base blackish. Front coxæ contiguous, mesosternum triangular, middle coxæ slightly separated. Antennæ slender, filiform, a little more than one-half as long as the body, 4th joint equal to 5th. Length .25 inch. = 6.5 mm. Hab. Isle Royale, Lake Superior; but one specimen found."

P. obscurus, Lec. Proc. Ac. Phil. 1859, p. 79.

This species presents a slightly different form, the humeral angles being quite prominent and showing traces of a tubercle. The color varies from quite a light brown to a deep bluish black. Length .38 to .58 inch. = 9.5 to 15 mm. Hab. California.

P. ater, Lec. Mss.

The description of this heretofore unpublished species has been given us by Dr. Horn from the manuscript of the late Dr. Leconte.

Black, very sparsely and finely pubescent, head punctured; prothorax half wider than long, strongly punctured, much rounded at the sides; elytra strongly and equally punctured; antennæ and legs tinged with piceous. Length .25 inch. = 6.5 mm. Hab. Buffalo, N. Y.; one ♂.

P. aeneus, Lec. Proc. Ac. Phil. VII, 1854, p. 18; Entom. Rept. 1857, p. 60.

This very distinct species is of a uniform shining black color. Length .27 to .35 inch. = 7 to 9 mm. Hab. Oregon.

P. dimidiatus, Kb. Fn. Bor. Am. IV, p. 173; Lec. J.A.P. ser. 2, II, p. 33; *ant-icum* Dej. Cat. 3d ed. p. 355; *palliatum* Hald. Trans. Am. Phil. X, p. 41; *Kalmi* Schoenh. Syn. Ins. I, 3, p. 442; *bajulus* Linn. Mus. Lud. Ul.; p. 76; *Mannerheimi* Lec. Ent. Rept. 1857, p. 60.

This species varies in the lighter or darker shade of its color but can always be recognized by the character given. Length .35 to .50 inch. = 9 to 12.5 mm. Hab. United States.

P. vulneratus, Lec. Ent. Rept. Expl. and Surv. XII, 1857, p. 60.

Color uniform black, somewhat shining, with an oblique band of white hair on each elytron. Length .32 inch. = 8 mm. Hab. Cal.

P. varius, Fab. Spec. Ins. I, p. 241; Oliv. Ent. IX, 70, p. 54, t. 5, f. 55; Lec. J.A.P. ser. 2, II, p. 33; *versicolor* Gmel. et Linn. I, 4, p. 1852; *bicinctum* Dej. Cat. 3d ed. p. 355; *albofasciatus* Proc. Ent. Soc. Phil. I, 1862, p. 274.

The coloring of this species varies greatly. It is generally light rufous, darker behind the middle with two transverse white bands, but the species is found of many darker shades and even entirely black with only the extreme base of the elytra a shade lighter. The anterior band is arcuate, the posterior quite straight. Length .25 to .36 inch. = 6 to 9 mm. Hab. United States.

P. decussatus, Lec. Ent. Rept, XII, 1857, p. 61.

Varies in color as the preceeding does, but is easily distinguished by the bands being oblique. The anterior is slightly arcuate and bent downward toward the suture, the posterior in the opposite direction. Length .25 to .30 inch. = 6 to 7.5 mm. Hab. California.

P. nitidus, Lec. Trans. Am. Ent. Soc. V, p. 66.

The color of this species varies from yellowish brown to black but the elytra are always lighter before the middle. The bands are as in *decussatus* and the species can only be surely distinguished by the very shining surface of the thorax and elytra. Length .25 to .28 inch. = 6 to 7 mm. Hab. Nevada,

MERIUM, Kirby.

Contains only one species:

M. proteus, Kirby. Fn. Bor. Am. IV, 1837, p. 172, t. 5, f. 5; Mann. Bull. Mosc. 1853, III, p. 247; Lec. J.A.P. ser. 2, II, p. 32.

This species is very distinct by the raised lines of the thorax and elytra. The color is brown and the lines being a lighter tint and quite shining resemble dirty ivory. Length .45 to .60 inch. = 11 to 15 mm. Hab. Colorado, Hudson Bay Terr.

SYNOPSIS OF BUTTERFLIES.

By REV. GEO. D. HULST.

COENONYMPHA, Hub.

1. **California**, Doub. Hew. Gen. Diur. Lep. II, p. 398, pl. 67.

Wings above almost uniform dusky white, showing however quite plainly the markings of the under side. Sometimes these exist on the upper side, making on both wings a broad marginal band, slightly lighter in color. There is often a small round more or less obsolete

ocellus near the apex, and several in a submarginal row on the hind wings.

Beneath, gray brown with the outer third and inner margin lighter on the primaries; this outer band is lightest towards the base, and at margin contrasts strongly with the gray brown of the base. The secondaries correspond with the primaries, but with outer margin somewhat darker. The primaries generally have one ocellus, the secondaries several, all more or less obsolete. Expands about 1.5 inches. Hab. Pacific Coast.

Var. *a. Brenda*, W. H. Edw. Trans. Am. Ent. Soc. 2, 375. *Eryngii*, Hy. Edw.

Light cream white above. Beneath, with central dark edging distinctly marked, often pinkish. Sometimes without ocelli. Cal.

Var. *b. galactina*, Bois. Ann. Soc. Ent. Fr. 2me, ser. X, p. 309; *Ceres*, Bütl.

Wings above light cream white with lines fainter and base blackish. California.

Var. *c. Kodiak*, W. H. Edw. Tr. Am. Ent. Soc. 2, 375.

Wings above light brown with a gray shade. Beneath, the central light shade, white. Kodiak.

Var. *d. Pulla*, Hy. Edw. Pap. 1, 51.

Entirely dark fawn color above with blackish at base of wings. Beneath, dull brown with markings indistinct. Cal.

2. *inornata*, W. H. Edw. Proc. Acad. Sci. Phil. 1861, 163.

Wings above, ochrey brown, lighter on disc. Costal margin of primaries and abdominal margin of secondaries grayish. No spots above or below.

Beneath, same color as above from base to beyond middle, then a transverse cinereous ray of lighter color, and beyond this grayish. Sometimes the ray disappears. Secondaries gray, with a slight greenish tinge, darkest from base to middle, and this shade separated from the paler margin by a transverse tortuous interrupted ray, the course of which is parallel with the outer margin. Expands about 1.5 inches. Manitoba, Newfoundland.

Var. *a. ochracea*, W. H. Edw. Proc. Acad. Sci. Phil. 1861, 163.

Bright glossy ochrey yellow above without any mark or spot, except as marks below show through; base of wings dark gray. Beneath, primaries the same color but grayish along outer and abdominal margin; a submarginal row of several obsolete ocelli; White rays as in *inornata*. Rocky Mts. and Pacific Coast.

Var. *b. Ampelos*, W. H. Edw. Trans. Am. Ent. Soc. 3, 213.

Above bright glossy ochreous; beneath nearly the same. Rays as in *inornata*. No ocelli above or below. Oregon.

Var. *Elko*, W. H. Edw. Can. Ent. 13, 57.

Upper side more yellow than *Ampelos*. Underside much lighter, the basal and outer parts contrasting in color. Nevada.

3. *Pamphila*, Linn. Syst. Nat. Ed. X, 472. *Pamphiloides*, Reak.

Upper side almost uniform ochrey yellow; all wings edged outwardly with brown more or less dark. A single ocellus more or less obsolete near apex of primaries. Costa of primaries dark.

Beneath, primaries as above, ocellus somewhat brighter. Secondaries brown darkest towards base, somewhat reddish outwardly; outer third lighter. Near the middle is an irregular ray, well marked, much lighter, extending from anterior margin half way across the wing. Expands 1 to 1.25 inches. Rocky Mts.

The above is our determination of the species of this genus with the material we have at hand. The species are very variable, and even Mr. Butler, who is known as a multiplier of species on superficial differences says (Cat. Satyr Brit. Mus.): "the form of the local bands, and the constancy of the ocelli can not be relied on in *Coenonympha*". We may add, nor can the shade of the general color above and below. The forms placed as variations of *California* and *inornata* do not all we think deserve that distinction. *Inornata* itself is probably not more than a variety, if it be not a synonym of *C. Tiphon*, Rott, but we have not the material on hand to make the statement positively.

With regard to *pamphiloides* Mr. Strecker has Reakirts type, and says it differs in no way from *pamphila*.

SOCIETY NEWS.

Sept. 27th.—The Society met for the first time at its new rooms in the Brooklyn Polytechnic Institute. Prof. Mayer in the chair, 18 members present.

Mr. M. C. Linel was elected a member of the Society, and Messrs. J. Mohns, F. A. Stinner and S. P. Sammis were proposed for membership by Mr. Gade.

It was resolved to convey to the authorition of the Polytechnic Institute the thanks of the Society for the accomodations furnished.

An invitation was also extended to all connected with the Institute to attend the meetings of the Society.

Messrs. Weeks and Cramer were appointed a committee to report upon the feasibility of a series of short lectures on Entomology to be given by specialists, members of the Society.

Mr. Geo. Gade gave the results of some observations on the habits of *Pimpla (Rhyssa) lunator* usually classed as an ichneumon. The males are often observed congregated upon an apparently sound part of a tree; scraping away bark, sometimes to the depth of $\frac{1}{4}$ inch, the ♀ was found ready to emerge. Retiring, the males at once returned and one finally succeeded in copulating with the ♀

while yet she was in the cell or burrow. They remain but a short time *in copula*, then the ♀ completes her exit from the larval habitation, and flies about, further unmolested by the ♂, in search of a suitable tree upon which to oviposit. One found, she explores all crevices with her antennæ and a satisfactory spot found—often a hole left by a *Pimpla* in emerging—she deposits an egg, which is very small, smooth, oval, and yellowish brown in color.

The oviposition is performed as follows: the long ovipositor is bent, passed between the posterior legs, the abdomen is elevated almost to a right angle with the thorax, and the ovipositor guided by the anterior tarsi is forced with a ramming motion into the wood to the depth of from 2 to 3 inches.

The ovipositor is composed of three pieces; two, grooved and pubescent act as a sheath to the borer proper and do not enter the wood; the third has the appearance of a horse hair, is rather flattened and tapers somewhat to the tip, where it is armed with about 21 saw teeth at each side and about 14 on the upper edge. If we now make a cross section of the borer at this point we find that it consists of three pieces; the upper part horse shoe shaped with a T rail projection on the ends and the two lower parts each like half a horse shoe furnished with a groove in which the T rail fits easily and in such a manner that the pieces may slide upon each other without separating and to leave the borer capable of sufficient expansion to allow the egg to pass through the hollow centre.

In boring the ovipositor has not only a ramming, but also a sliding motion, the side pieces which do the cutting, being forced forward alternately until the desired depth is reached.

Pimpla has been supposed an Ichneumon, but I have long doubted this because I never found in the wood any larva upon which it could feed. I have during the past season watched many females ovipositing and have cut off the ovipositor when ready to be withdrawn and in no instance have I found a larva of any kind anywhere near the point reached by the borer and where the egg was deposited. The conclusion is therefore that the larva is a true wood feeder and not parasitic.

Messrs. Hulst and Weeks stated in the discussion following, that they had reached the same conclusions from independent observation.

Mr. Hulst gave an outline of a paper read by Prof. Macloskie of Princeton at the meeting of the A.A.A.S. on the Dynamics of the Insect Crust, and in the course of the discussion of this subject Mr. Cramer stated that he had observed in a larva of *Papilio philenor* that 24 hours after it was blown and mounted the oral parts were still in motion as though the insect were alive.

Prof. Mayer gave an account of how he had collected during the past season and secured many rarities in Lepidoptera.

Mr. Cramer exhibited and explained a device for blowing and preserving lepidopterous larvæ, which was universally approved by the members present. Mr. Cramer illustrated the subject by preparing a specimen. An abstract of his address was offered for publication.

A. C. WEEKS, Rec. Secy.

Members are requested to note the change of place of meeting, and it is also desired that all those having books of the Society do return them as soon as conveniently possible, as the Library is about to be re-arranged and the books catalogued.

SOCIETY NEWS AND NOTES.

At the meeting of the Society Sept. 25th, 1884, were present 11 members. President J. B. Smith in the chair. Visitors: Messrs. J. G. Holland, D.D., and Mr. Claggis of Pittsburgh, and Mr. G. J. Angell of New York. On motion Dr. Holland was invited to sit as a corresponding member.

Mr. Wm. Beutenmuller was proposed for membership by Mr. Hulst, and Mr. G. J. Angell by Mr. Roberts.

Messrs. Julius Mohns, F. A. Stinner and Stephen P. Sammis were duly elected as members of the Society.

The action of the President and Secretary in arranging for exchanges with the Belgian Entomological Society, the Stettiner Entomol. Verein, and the Entomologist, of London was approved, and the Corr. Secretary was directed to endeavor to establish exchanges with all Entomological Societies and publications, and to accept any reasonable offer of exchange made by any other scientific Society or publications.

Mr. Smith stated the substance of a recent paper by Lieut. T. L. Casey, at this meeting presented to the Society, commenting on the division of *Harpalus viridiaeneus* and requesting the members to collect as many specimens as possible of that species in order that the correctness of Lt. Casey's action could be verified.

Mr. Weeks reported the capture of *C. modesta* on Staten Island: a new locality for this beetle, which in the vicinity of New York had been hitherto found only in one spot in New Jersey.

A discussion on the range of *Euptoieta claudia* was participated in by the Lepidopterists. The species is not uncommon, locally, around New York: Dr. Holland says it is not found near Pittsburgh.

Mr. Smith reported that in company with Mr. C. H. Roberts he had thoroughly tested the trap described at Vol. VI, p. 69, of the Bulletin and had found it a complete success. This led to a discussion on the attraction of insects to light. Dr. Holland stated that the burning gas wells near Pittsburgh illumined the country for miles around, and insects were attracted by the thousands, so that a circle of scorched insects was each morning to be found. Among them were many large *Bombycidae* and principally males. Over 100 ♂ *Saturina io* were found one morning. He fears this may eventually cause the destruction of the larger *Bombycidae* in that vicinity; the larva of *io*, else common enough, is this season extremely rare. At an electric light a large number of very good species had been taken. The brighter and more intense the light, the greater its attraction to insects. Mr. Græf related the experience of some collectors, who threw a powerful light against a white sheet, giving a large white surface which proved very attractive.

Mr. Smith related his practice in the Catskills, pulling down a thin white blind to an open window and setting a lamp behind it. The insects flew to the white surface found their way into the room around the edges and quietly settled about the walls where they were taken next morning.

Mr. Schwensen had often noted the attraction of an electric light near the Central Park, to *Coleoptera*: *Carabidae*, and especially *Harpalini* came in consider-

able numbers. *Dytiscidae* and *Hydrophilidae* only when the wind was favorable—i.e. from the Park lakes.

The attraction of sugar to insects was then brought up, and Mr. Claggis who had collected during the past season in the Isle of Jamaica gave the result of his experience. Sugaring trees was without result. The flowers exercised a superior attraction. Flowers were so abundant that collecting at them was tedious, so he tried sugaring flowers, and with complete success. The flowers artificially sweetened swarmed with insects, while the others were deserted. Large *Bombycidae* too came to this bait that never came to sugar on trees. Other members gave their experiences with flowers as an attractor and Mr. Smith gave the result reached by Mrs. Fernald as stated by Prof. Fernald at the meeting of the Ent. Club of the A.A.A.S.

Messrs. Hulst and Holland discussed the date of the appearance of *Argynnis diana* in N. C. finding it ranged from latter part of June to the middle of August.

A. C. WEEKS, Rec. Secy.

On our table is a "Synopsis of the North American *Trichopterigidae*" by Rev. A. Mathews, Gumley, England. Dr. Mathews is a well known authority on the family here monographed by him, and having the advantage of the material in the collection of Dr's. Leconte and Horn, his work is up to the present state of American collections. Significant is this passage in the introduction "The *Trichopterigidae* are probably the most extensive Family of the Coleoptera". Less than 100 species are catalogued in the paper, and there is a very large field therefore for collectors who will seek out these minute forms. The paper is an excellent one, and is published in the Trans. Am. Ent. Soc. XI, pp. 113—156.

We have also a "Synopsis of the *Philonthi* of boreal America" from the pen of Dr. Horn. This was a work much needed, because so many species in collection were named by Fauvel, but not described, and oft times the mss. name was synonymous with one before given or the species had been previously described. Great confusion therefore existed in collections. Dr. Horn now gives us a simple easily comprehended classification, dividing that part of the genus treated of by him into three genera—*Philonthus*, *Actobius* and *Cafius*—and about 118 species. The paper is published Tr. A. E. Soc. XI, pp. 177—244.

Table of *Balaninus*, *Germ.*

By FREDERICK BLANCHARD.

The following is offered for the purpose of making known an undescribed species of *Balaninus* recognized since the publication of Dr. Horn's synopsis Proc. Amer. Phil. Soc'y. 1873, p. 457, reference to which must be had for further details. For convenience the sinuation or angle formed by the outer or free edge of the femoral tooth with the continuation of the femur is termed the angle entering the femur.

First joint of antennæ shorter than the second, Mesosternum less convex.....
7. *caryatrypes*.

First joint of antennæ longer than the second.1.

1. Beak of ♀ longer than the body except in certain specimens of *nasicus* where it is only equal in length to the body.....2.

Beak of ♀ short, two thirds or three quarters the length of the body. Tooth of femur with the outer edge oblique, the angle entering the femur obtuse and more or less rounded.....3.

3. Appendices of claws broad rectangular. Femoral teeth larger. Scape of antennæ in the ♀ long.....1. *obtusus*, n. sp.

Appendices narrow acute. Thorax more convex. Scape of antennæ in the ♀ short barely exceeding in length joints one and two of the funicle....2. *uniformis*.

2. Tooth of femur with the outer edge oblique. The angle entering obtuse.....4.
Tooth of femur with the outer edge perpendicular forming with the apex of the femur a right angle which is not rounded.....5.

5. Scales beneath oval. Tibiæ moderately mucronate.....3. *nasicus*.
Scales beneath narrow, hair like. Tibiæ more strongly mucronate. Last ventral of the ♀ more deeply impressed.....4. *caryae*.

4. Thorax of ♀ longer than wide. Scape of antennæ long.

Metasternum of ♂ in well preserved specimens, with a small, rounded, condensed patch of yellow scales each side of the median line. Femoral tooth small, the angle entering rounded.....5. *rectus*.

Thorax of ♀ not longer than wide. Pygidium of ♂ concave at tip and glabrous, the depression surrounded by moderately long silken hairs. Scape of the antennæ of ♀ short, equal to joints one and two of the funicle. The angle entering the femur not rounded.....6. *quercus*.

B. obtusus, n. sp. Form short, robust, clothed with cinereous scale like hairs above, varying in color from cinereous to ochreous and brown, beneath with elongate silvery or yellowish scales. Beak of ♀ two thirds or three quarters the length of the body, that of ♂ shorter; the base to the insertion of the antennæ blackened, distinctly punctured and more or less striate, the tip also darker. The antennæ are inserted at the middle of the beak in the ♂, behind the middle in the ♀; scape long in both sexes, the first joint of funicle longer than the second. Thorax moderately convex, the sides slightly rounded from base to middle, then strongly rounded, narrowed and sinuate to the apex, coarsely and densely punctured and covered with transversely arranged scale like hairs which form a paler vitta each side. Elytra about three times as long as the thorax, a little wider behind the humeri, the sides rounded to the tips which are slightly separated. Vestiture nearly unicolorous, or ochreous with irregularly placed brown spots, or brown sprinkled with paler spots. Femoral teeth strong, outer edge oblique, forming an obtuse angle with the continuation of the femur. Tibiæ moderately mucronate. Appendices of claws broad, nearly or quite rectangular, slightly rounded. Length without the beak, 6 to 8 mm.—♂. Abdomen with first and second ventrals broadly impressed, the last ventral impressed at tip, truncate and slightly emarginate. —♀. Abdomen convex, last ventral rounded at tip.

Mass. Beaten from Hazel-nut. N. H. (Tex. and Neb., Horn.)

Dr. G. M. Levette of Indianapolis has sent me specimens of *B. caryae* bred by him from Indiana Pecans. He has also bred *rectus* from acorns

gathered in summer and brought from Arizona, the beetles appearing the following December indoors.

BIBLIOGRAPHY.

1. *Balaninus obtusus*, n. sp. 6—8 mm. N. H., Mass., Nebr., Tex.
2. *uniformis*, Lec. Pacif. R.R. Rep. 1857, p. 57; Horn, Proc. Am. Phil. Soc. 1873, p. 459.—4.5 to 7 mm. Can., Eastern and Middle States, Kans., Tex., Cal., Or.
3. *nasicus*, Say, Curc. N.A., p. 16; Am. Ent. edit. Lec. I, p. 279; Gyll. Schoenh. Gen. Curc. III, p. 377; Horn, Proc. Am. Phil. Soc. 1873, p. 460; *nasatus* || Say loc. cit.; *rostratus* Gyll., loc. cit., p. 374; *sparsus* Gyll., loc. cit., p. 379, 4.5—8.5 mm. Eastern and Middle States, Geo. Kans.
4. *caryae* Horn. Proc. Am. Phil. Soc., 1873, p. 460, 5 to 9 mm. Ind.
5. *rectus* Say, Curc. N.A., p. 16; Am. Ent. edit. Lec. I, p. 279; Horn, Proc. Amer. Phil. Soc. 1873, p. 459; *rectirostris* Gyll. Schoenh. Gen. Curc. III, p. 376; *Sayi* Gyll., loc. cit., p. 375. 5—7 mm. Middle and Southern States, Ariz.
6. *quercus*, Horn. Proc. Am. Phil. Soc. 1873, p. 458. 5—9.5 mm. Mass. Tex.
7. *caryatrypes* Boh. Schoenh. Gen. Curc. VII, 2, 276; Horn, Proc. Am. Phil. Soc. 1873, p. 458. 8—11 mm. Middle States and Westward.

Note on the species of *Gaurotēs*, *Le Conte*.

By FREDERICK BLANCHARD.

With the exception of the observation on the form of the mesosternum I am indebted to Dr. Horn for the following notes:

The genus *Gaurotēs* as hitherto defined would only include *G. cyanipennis*. *G. abdominalis* and, as Mr. Ulke has informed me, *G. Cressoni* have the mesosternum simple as in the genus *Acmaeops*, not protuberant as in the first mentioned species. The superficial resemblance however, of the three species is remarkable. They differ as follows: *G. cyanipennis* has the antennæ entirely pale and the abdomen piceous with slight metallic lustre; *abdominalis* with the same form of body has from one to three basal joints of the antennæ piceous and the abdomen yellowish testaceous, while *Cressoni* with a more robust form of body has the antennæ, tips of femora, tibiæ and tarsi piceous and the abdomen as in *abdominalis*.

The variation in the form of the mesosternum is an indication of the instability of what are usually regarded as valid generic characters. A strict interpretation of the mesosternal structure would separate these species. For the present they might remain associated until a renewed study either better develops the difference between *Acmaeops* and *Gaurotēs* or shows the necessity, of uniting them.

SYNOPSSES OF LEPIDOPTERA.

By REV. GEO. D. HULST.

CHIONOBAS, Bois.

OENEIS, Hub.

1. *semidea*. Say. Am. Ent. III, pl. 50. *Oeno* Bois, *Also* Bois, *assimilis* Butl., *subhyalina* Curt., *eritiosa* Harr.

Wings above nearly uniform dark brown, the markings of the under-side of the secondaries appearing through; the whole outer margin very narrowly lined with black, Beneath; primaries a little paler, marbled at apex with black and white; secondaries marbled with black and white, a broad dark band crossing center edged outwardly with white. The primaries have sometimes a single ocellus above and below near apex. White Mountains, Labrador, Rocky Mts. Expands about 2 inches.

2. *Bore*, Schn. Var. *Taygete* Hub. Zutr. Pap. 1, Nymph. IX, Oread. D, Nubilæ, 3, 1.-4; *Bootes* Bois.

Wings above dark brown, female paler, somewhat yellowish, with darker marginal bands; outer border narrowly edged with black. Beneath, flecked with hoary at apex of primaries and on whole of secondaries except borders of the middle band. A darker submarginal band; middle band edged with black inwardly, white outwardly. Primaries sometimes with an almost obsolete ocellus near apex. Expands about 2 inches. Labrador.

3. *Crambis*, Frey. Neu. Beitr. V, pl. 440, f. 3 and 4. *Taygete*, H. S. *Also*. Moesch. *Oeno*, Scud.

Wings above varying from dark brown to yellowish brown, secondaries with design of lower surface showing through. Beneath, primaries like upper surface, hoary tipped; secondaries marked with blackish brown, yellow brown, and grayish white, with a darker middle band edged with gray; the outer border narrowly edged with black. The primaries have one or more ocellated spots submarginally above and below. Often a suggestion of these on under surface of secondaries. Expands about 2 inches. Labrador.

4. *Jutta*, Hub. Eur. Schm. f. 614 and 615. *Balder* 45.

Wings above dark brown with dark spots along the border in a yellowish field. Discal space of primaries almost black. Beneath, primaries much as above, but with a yellowish shade, and hoary at apex; secondaries marbled with brown black and gray, the inner half lightest, and this edged with gray outwardly. Black spots repeated in yellow field, but somewhat more indistinct. Expands 2—2.25 inches. Maine, Labrador.

Var. *a. Balderi*, Hub. Zutr. 981—982. *Balder*, Bois.

Smaller and less ocellated than *Jutta*.

5. *Uhleri*, Reak. Proc. Ent. Soc. Phil. VI, 143.

Wings above reddish brown, the secondaries somewhat the paler. Primaries along costa, on the veins, and along outer margin dull brown; secondaries crossed by many dull slightly russet brown striæ loosely forming a basal, median, extra median and marginal band. These formed by markings below showing through. Beneath, primaries white anteriorly striated with black, pale russet posteriorly; secondaries white, striated with black as shown above. All wings marked more or less with ocelli, generally one to three, these being more distinct beneath. Expands about 2 inches. Rocky Mts.

Var. *a. Varuna*, W. H. Edw. Can. Ent. 14, 2.

Smaller, generally a shade redder above, more ocellated. Montana.

6. *Chryxus*, Doub.-Hew. Gen. Diur. Lep. II, 383, pl. 64. *Calais*, Scud.

Wings above ochrey yellow, the primaries often clouded from base to median space with brown, which generally takes the form of a broad diffuse dash, back of and at end of discal space. Costa and outer margins of both wings dark brown. Markings below often showing through all wings. Beneath, primaries white, striated with black along costa; blackish along margin; dark buff posteriorly. Secondaries white, heavily marbled and striated with black, showing more or less distinctly a broad median band black within edge, white outwardly. One or more ocelli submarginally on each wing, generally three on primaries, and one on secondaries, all repeated below. Female paler. without basal clouding on primaries. Expands 2—2.50 inches. Colorado, Rocky Mts.

7. *Ivallda*, Mead. Can. Ent. 10, 196.

Very much in markings as *Chryxus*, but with the upper surface fuscous instead of fulvous; there is a submarginal row of gray ochraceous spots between the nervures. Ocelli as in *Chryxus*. Expands 2.25 inch. Sierras between Nevada and Cal.

It is with extreme hesitation I write this as a species, inasmuch as its variation from *Chryxus* is only in coloration; a very frail basis for specific distinction. But where taken, it is entirely uniform in color, and this color has not been found, so far as I know, where specimens of *Chryxus* have been taken. It is a near offshoot from *Chryxus*, but may stand with specific rank until intergrades are found.

8. *Nevadensis*, Bois. Mss. Felder, Reise Nov. Lep. p. 489. *Californica*, Bois. *Iduna*, W. H. Edw.

Wings above fulvous ochreous; costal margin, base, and outer margin brown. Also on males a broad dash of brown posterior to discal space, outwardly including it in part, sometimes entirely and blending with costal margin. Secondaries somewhat paler than primaries, as are all the wings of the female. Beneath, primaries somewhat paler than above, somewhat striated with black along costa, hoary and marbled at apex; brown marginally. Secondaries, heavily striated and marbled with black on a dull white ground, these, as is usual, forming a broad more or less definite median band; darker towards margin. The primaries are more produced in the males than in the females, and the costa is less arched. This is however a tendency of the genus. Ocelli variable, the one near apex of primaries, and near anal angle of secondaries more permanent, the former, as far as I know, always present. Expands about 2.50 inches. Cal., Nevada, and Northward.

Var. *a. gigas*, Butler, Cat. Sat. Brit. Mus. p. 161, pl. 2.

Differs in having the ocelli of the primaries when present, not in a straight line. Vancouvers I.

I have given this species conscientious study, and have tried to convince myself that there are here 4 species or anything more than one and one variety. But I can not believe we have to do with more than one species and am not fully convinced of the validity of *gigas* as a variety. The various names have been based upon markings which are notably variable in all species of the genus. Mr. Butler's words with regard to *Coenonympha*; have more appropriateness spoken with regard to *Chionobas*: "the form of the local bands, and the constancy of the ocelli, can not be relied on".

In the preparation of this paper I have followed Staudingers arrangement of the species. The writings of Möschler and Scudder have not been overlooked; but I cannot agree with their conclusions.

For the generic characters of *Chionobas* and *Coenonympha* we refer to the synopsis of genera in Vol. VI.

A new insect injurious to Wheat.

BY C. V. RILEY.

The following description was presented to the Washington Entomological Society at its monthly meeting, Nov. 6th. The description is comparative with *I. tritici*, Riley, with which it is nearest allied.

Isosoma grandis, n. sp.

Female.—Length of body 4.2 mm., expanse 7.6 mm. Antennæ rather more slender

and less clavate than in *tritici* and but half the length of thorax. Thorax with the mesonotum slightly more rugulose; wings larger and less hyaline than in the winged specimens of *tritici*, the veins extending to outer third, the submarginal nearly 4 times as long as marginal; legs with the femora less swollen. Abdomen not so long as thorax, stouter than in *tritici*, ovate-acuminate, approaching typical *Eurytoma*. Less hairy than *tritici*, especially about legs, the hairs of abdomen being less numerous, less regular and shorter. Coloration similar to that of *tritici*, but brighter and more highly contrasting, the pronotal spot larger and brighter yellow, the pedicel of antennæ yellow and the femora with a definitely limited suboval, yellowish spot below, near the tip, extending two-fifths the length of femur on front pair, smaller on middle pair and still shorter and less definite on posterior pair.

Larva.—Greenish-yellow in color. Average length 6 mm; otherwise of same proportions and structure as in *tritici*.

Pupa.—Average length 5 mm. Except in larger size and ample wing-pads undistinguishable from that of *tritici*.

Described from 24 females, reared from wheat stems in June, and taken by Mr. F. M. Webster at Lafayette, Indiana. The species is treated of in my forthcoming report as U. S. Entomologist and works in wheat much as *tritici* does. Its larger size, stouter build, aside from the other characters mentioned readily distinguish it, however; while from *hordei* Harris, *vitis* Saunders, and *elymi* French, it is still more readily distinguished.

SYNOPSIS OF COLEOPTERA.

CALLIDIUM, Fab.

Contains species resembling *Phymatodes* in general form and specially characterised by the equal palpi. The species may be separated as follows:

Thorax and elytra blue.

Thorax finely punctured, impressed. *antennatus*.

Thorax deeply punctured, not impressed. *janthinum*.

Thorax and elytra testaceous or yellow.

Body testaceous.

Elytra with raised glabrous lines. *cicatricosum*.

Elytra and thorax unicolorous, testaceous. *aereum*.

Body black, thorax yellow, elytra variable. *hirtellum*.

Body, thorax and elytra black. *vile*.

C. antennatum, Newn. Ent. Mag. V. 1838, p. 393; Lec. J.A.P. ser. 2. II, p. 34.

The entire insect is blue; elytra deeply punctured; thorax slightly atulaceous and variably impressed, and in ♂ wider than the elytra. The antennæ are longer than the body and thickened at the base, each joint in ♂ clubbed at outer end. The club of femora is larger in ♂ than ♀. Length .55 inch. = 14 mm. Hab. United States.

C. janthinum, Lec. J.A.P. ser. 2, II, p. 34; Dej. Cat. 3d ed. p. 355.

This species is generally smaller than preceding, violet or blackish blue, beneath almost black, and the elytra are wider than thorax. The antennæ are quite stout, tapering toward tip and are serrate. Length .40 to .52 inch. = 10—13 mm. Hab. Texas.

C. cicatricosum, Mann. Bull. Mosc. 1853, III, p. 246.

The thorax is marked by three longitudinal raised lines and is densely pubescent; the elytra are thickly coated with conspicuous hair, except where the surface is interrupted by raised glabrous lines which cross each other and present the appearance of net work. Length .50 inch. = 12.5 mm. Hab. Colorado.

C. aereum, Newm. Ent. Mag. V. 1838, p. 393; Lec. J.A.P. ser. 2, II, 1850, p. 33; *pallipes* Hald. Trans. Am. Phil. X, 1847, p. 37.

This species varies considerably in size and but little in other respects. The uniform testaceous color renders it readily distinguishable. Length .34—.50 inch. = 8.5—to 12.5 mm. Hab. Atlantic States.

C. hirtellum, Lec. S.M.C. No. 264, XI, 1873, p. 172.

The elytra are sometimes barely tipped with black and sometimes completely dark in color. The thorax is always distinctly yellow and the abdomen black. Length .25—.28 inch. = 6—7 mm. Hab. Colorado, California.

C. vile, Lec. S.M.C. 1873, No. 264, XI, p. 172.

Readily known by the small size, black color, and coarse sculpture. Length .18 inch. = 4.5 mm. Hab. California.

XYLOCRIUS, *Lec.*

This genus presents another remarkable form. The antennæ are very stout, quite hairy, the thorax very convex and rounded at the sides, the elytra constricted behind the base and strongly rounded at tip and the entire surface deeply punctured and pubescent. Two species have been distinguished:

More slender, elytral punctures before middle gross, somewhat confluent, surface shining; behind middle finer, surface opaque **Agassizii**.
More robust, surface all shining, punctures large, foveate, irregular, more or less confluent. **cribratus**.

X. Agassizii, Lec. Proc. Ac. Phil. 1861, p. 357.

The hair behind the middle of elytra is more dense, and 3d and 4th joints of antennæ about equal. Length .45 inch. = 12 mm. Habitat, California.

X. cribratus, Lec. S.M.C. 1873, No. 264, XI, p. 172.

Pubescence equal throughout; 3d joint antennæ one-half longer than 4th. Length .55 inch. = 15 mm. Hab. California, Nevada.

CERAMBYCOIDES.

Eyes coarsely granulated, front coxal cavities open behind (except in *Compsa*),.....

Cerambycini.

Eyes variable, front coxal cavities angulated, closed behind.....

Obrini.

Eyes finely granulated.

Scutellum rounded, tibial spurs small, elytra not sinuate..... 1.

Scutellum acutely triangular, elytra not sinuate..... 2.

Scutellum rounded, or broadly triangular (*Cyllene*), tibial spurs large, thorax never tuberculated, nor spinose; elytra not sinuate..... 3.

Scutellum broadly rounded, thorax not tuberculate, nor spinose; sides of elytra deeply sinuate near the humeri..... 4.

1. Legs long, slender, thighs pedunculated and suddenly clavate, front coxal cavities open behind.

Antennæ with poriferous system,..... Ancylocerini.

Antennæ without poriferous system,..... Rhopalophorini.

Legs slender, thighs not pedunculated, nor clavate, front coxal cavities open behind.

Front coxæ rounded,..... Paristemiini.

Front coxæ transverse, cavities angulated,..... Rosaliini.

2. Front coxal cavities closed behind..... Callichromini.

Front coxal cavities open,..... Trachyderini.

3. Tibiæ carinated,..... Stenosphenini.

Tibiæ not carinated,..... Clytini.

4. Prothorax rounded, never as wide as elytra at humeri,..... Agallissini.

CERAMBYCINI.

Thighs not toothed behind.

Ligula more or less corneous, (*Oemes*)..... 1.

Ligula membranous.

Middle coxal cavities angulated, (*Cerambyci*)..... 2.

Middle coxal cavities rounded, (*Ibidiones*)..... 3.

Thighs beneath armed with a broad tooth, (*Curii*)..... 4.

1. Epimera of mesothorax large.

Front trochantins very distinct.

Palpi very unequal, dilated.

Prosternum laminiform, antennæ rough with elevated points, mesosternum very narrow.

Prothorax lobed at base,..... Malacopterus.

Prothorax constricted at base,..... Oeme.

Prosternum not laminiform, antennæ very hairy beneath, joints 3—6 with a terminal spine.

Body uniformly pubescent,..... Eucrossus.

Body with transverse bands of yellow pubescence,..... Dryobius.

Palpi short, equal, slender.

- Front coxæ contiguous, hardly prominent, middle coxæ distant. **Haplidus.**
 Front trochantins not visible **Achryson.**
 Epimera of mesothorax small **Gracilia.**
 2. Antennæ 11-jointed, with recurved hooks on joints 3—6 (prothorax plicate, armed, bispinose) **Hammaticherus.**
 Antennæ 12-jointed, sericeous, serrate **Axestinus.**
 Antennæ 11-jointed, without recurved hooks.
 Front coxal cavities angulated; antennæ, thighs and elytra not spinose 5.
 Front coxal cavities rounded or feebly angulated 6.
 5. Frontal suture deep; metathorax without scent pores.
 Prothorax uneven, tuberculate at sides **Brothylus.**
 Prothorax even (palpi equal) **Stromatium.**
 Frontal suture faint, scent pores distinct.
 Elongate, prothorax even, antennæ very long **Osmidus.**
 6. Scutellum acute, triangular, frontal suture very deep, antennæ very long, sulcate **Chion.**

Scutellum rounded behind.

Femora not strongly clubbed, antennæ not carinated.

Elytra with ivory spots, prothorax with dorsal callosities, and usually with lateral spines, antennæ unarmed **Eburia.**

Elytra without ivory spots, antennæ usually spinose.

Episterna of metathorax narrower behind, antennæ with sensitive spaces **Romaleum.**

Episterna of metathorax parallel, antennæ without sensitive spaces **Elaphidion.**

Femora not strongly clubbed, antennæ carinated.

Antennæ slender **Aneflus.**

Antennæ stout, joints excavated beneath **Eustroma.**

Femora strongly clubbed.

Antennæ bisulcate **Tylonotus.**

Antennæ not sulcate **Zamodes.**

3. Front coxal cavities closed behind **Compsa.**

Front coxal cavities open behind **Heterachthes.**

4. Form depressed, dull, slightly pubescent **Curius.**

Form cylindrical, polished, glabrous **Plectromerus.**

Ganimus Lec. is a synonym of *Malacopterus*. *Romaleum* has been formerly included with *Elaphidion*.

MALACOPTERUS, *Serv.*

Contains one species:

M. vittatus, Lec. S.M.C. No. 264, 1873, XI, p. 174.

A large testaceous species, sparsely pubescent, thorax and elytra punctured, the latter bearing two costæ and two narrow black lines. The mandibles present a singular character, being short, stout, acute at tip, and the external outline having a well defined obtuse angle near the tip, so that the front margin is straight and transverse. The legs resemble those of *Callidium*. Length .84 inch. = 21 mm. Hab. California.

OEME, *Newm.*

Contains four species separated as follows:

Thorax constricted at base, with a distinct tubular or cylindrical prolongation; elytra more or less distinctly costate.

Thorax densely punctured, a moderately impressed median line. ***rigida***.

Thorax punctured, a smooth median vitta. ***costata***.

Thorax more suddenly constricted; a transverse impression and plica on disk. ***strangulata***.

Thorax oval, more constricted at base than tip; on tubular prolongation at base; elytral costæ wanting, or the first only faintly indicated. ***gracilis***.

O. rigida, Say, Proc. Ac. Phil. V, p. 274; *linearis* Harr. Hartf. Trans. 1837, p. 85, pl. I, f. 8; Lec. J.A.P. ser. 2, II, p. 20; *indecora* Newm. Ent. p. 8; Lec. l.c. 1852, p. 177; *mucita* Hald, Proc. Ac. Phil. IV. 1847, p. 374.

Color uniform ferruginous, antennæ very robust. Length .60 inch. = 15 mm. Hab. New York, Florida.

O. costata, Lec. S.M.C. No. 264, 1873, p. 174.

Color dark, slightly pubescent, the elytra are wider than the thorax, with three narrow lines or costæ, the spaces between sparsely reticulate. The male has the antennæ as long as the body, joints 3—6 armed with acute spines. Length .90 inch. = 22 mm. Hab. California.

O. strangulata, Horn, Trans. Am. Ent. Soc. 8, p. 133, pl. II, f. 7.

Piceous, subopaque, pubescence very short. Elytra densely and finely punctured, with three elevated lines on each. The thorax is very suddenly constricted, short, bears a transverse impression and plica and readily distinguishes the species. Length .76 inch. = 19 mm. Hab. Utah.

O. gracilis, Lec. Bull. Buff. Soc. N.S. 4, p. 27.

Easily distinguished from all the other species by the form of the thorax. Color is deep dark brown. Length .48 inch. = 12 mm. Hab. New York.

EUCROSSUS, *Lec.*

Contains one species:

E. villicornis, Lec. S.M.C. No. 264, 1873, XI, p. 175.

A large pale brown insect resembling *Oeme* but less slender. Thorax dull sericeous, with a broad median line and on each side a large cica-trix, commencing near the base, extending in front of the middle, then suddenly bent inwards for a short distance, and then turning forward suddenly abbreviated. Elytra sparsely punctured and thinly pubescent, armed at suture with small spine. Antennæ densely fringed beneath with long soft hair, becoming thinner and vanishing on 8th joint. Length .72—.96 inch. = 18—24 mm. Hab. Arizona, California.

DRYOBIOUS, *Lec.*

Contains one species:

D. sexfasciatus, Say, Proc. Ac. III, 1824, p. 415.

A rare and beautiful insect easily recognized by the conspicuous bands of golden yellow pubescence, of which the thorax bears two and the elytra four, all except the anterior reaching from margin to suture. The hair on antennæ is very long. Length .75 to 1.10 inch. = 19—27.5 mm. Hab. Mississippi Valley.

HAPLIDUS, *Lec.*

Contains one species:

H. testaceus. Lec. S.M.C., No. 264, 1873, XI, p. 176.

A slender brownish insect easily known by the short slender palpi, and by the eyes being less deeply emarginate than in the other genera of the group, and scarcely embracing the base of the antennæ, which are inserted on a line with their front margin. Length .36—.56 inch. = 9—14 mm. Hab. California, Utah.

ACHRYSON, *Serv.*

Slender, subcylindrical species, with slightly dilated palpi. Two are known, distinguished as follows:

SYNOPSIS OF ACHRYSON.

Mesosternum wider, truncate at tip; elytra armed with terminal spine **surinam**.
Mesosternum narrow, subtriangular; elytra rounded at tip..... **concolor**.

A. surinam, Linn. Syst. nat. ed. XII, p. 632; *longicolle* Deg. Mem. V, p. 117, t. 14, f. 11; *pallens*, Fab. Ent. Syst. I, 2, p. 297; *surinumense* Oliv. Ent. IV, 67, p. 42, t. 14, f. 93; Chev. Ann. Fr. 1862, p. 264.

Color ferruginous, elytra with a few oblong black points; antennæ darker, a little longer than the body; eyes black; thorax rounded. Length .65 inch = 16 mm. Hab. Middle States to Mexico.

A. concolor, Lec. S.M.C., No. 264, 1873, XI, p. 176.

Same form as preceding but smaller; uniform brownish testaceous, thinly clothed with long pale hairs; the head and thorax are coarsely punctured, the latter not deeply but so closely as to produce a reticulate appearance, and in the center of each puncture is a small puncture from which proceeds a long white hair. The elytra are paler, polished, with rows of very distant large punctures, from which proceed long flying hairs. Length .34 inch. = 8.5 mm. Hab. Texas.

GRACILIA, *Serv.*

Very small slender insects, piceous in color, and finely punctured and pubescent.

SYNOPSIS OF GRACILIA.

Elytra unicolorous, rounded at tip.

Not shorter than abdomen..... *minuta*.

Shorter than abdomen; prothorax more rounded..... *manca*.

Elytra fasciate, truncate and serrate at tip..... *fasciata*.

G. minuta, Fab. Spec. Ins. I, 1681, p. 235; Oliv. Ent. IV, 68, p. 41, t. 3, f. 31; *pygmæa* Fab. Ent. Syst. I, 2, p. 323; &c. &c.; *fusca* Hald. Trans. Am. Phil. X, 1847, p. 43; Lec. J.A.P. ser. 2, II, 1850, p. 24.

This species has been introduced in articles of commerce from Europe. It is piceous in color, finely pubescent. The antennæ are hairy, in ♂ longer, in ♀ shorter than the body. Length .25 inch. = 6 mm. Hab. Atlantic States.

G. manca, Lec. J.A.P. ser. 2, II, p. 24.

This rare species is immediately distinguished by the abbreviated elytra and by the thorax which is shorter. Length .32 inch. = 8 mm. Hab. New York.

G. fasciata, Lec. S.M.C., No. 264, 1873, XI, p. 171.

Opaque black, pubescent, thorax alutaceous sparsely punctured; elytra more strongly punctured with the basal margin and a transverse fascia immediately behind the middle of white pubescence. Tip of elytra distinctly truncate with 3 or 4 serrations, the sutural and outer one prominent. Length .18 inch. = 4.5 mm. Hab. Lower California.

HAMMATICHERUS, *Serv.*

Contains one species, easily distinguished by the plicate, armed thorax, and bispinose elytra. It occurs rarely in Lower California.

H. mexicanus, Thoms. Class. Longic. 1860, p. 196.

AXESTINUS, *Lec.*

Contains one species:

A. obscurus, Lec. S.M.C., No. 264, 1873, XI, p. 177.

A large piceous insect with cinereous pubescence. Thorax longer than wide, narrowed in front with two discoidal impressions before the middle, sparsely coarsely punctured with feeble transverse rugae. Elytra densely punctured, bispinose at tip. Legs slender, thighs not clavate

or spinose, tibiæ slender, hind tarsi with 1st joint scarcely as long as two following. Length 1.20 inch. = 30 mm. Hab. Valley of Rio Grande.

BROTHYLUS, Lec.

Contains two species distinguished as follows:

Thorax armed with an acute tubercle at middle.....**gemmulatus.**
 Thoracic tubercle obsolete.....**conspersus.**

B. gemmulatus, Lec. Proc. Ac. Phil. 1859, p. 80.

Color fuscopiceous with short pubescence. The elytra are ornamented with scattered shining granules, larger at base and becoming smaller toward tip where they are only punctures. Length .67 inch. = 17 mm. Hab. Cal.

B. conspersus, Lec. Proc. Ac. Phil. 1859, p. 285.

Color nigropiceous, variegated with grayish hair. The dorsal aspect of thorax is tuberculate and the 4th joint of antennæ only one half as long as 3d or 5th in this and preceding species. The elytra are granulate as in preceding and bear two vague oblique fasciæ less pubescent. Length .73—.77 inch. = 18—19 mm. Hab. Oregon.

OSMIDUS, Lec.

Contains one species.

O. guttatus, Lec. S.M.C., No. 264, 1873, XI, p. 178.

An elongate piceous species, densely covered with short uniform cinereous pubescence, interrupted on the elytra with small scattered denuded spots. Prothorax oval with two basal and two discoidal impressions very faintly marked. Scutellum triangular, rounded behind. Legs rather long, thighs stout, not clubbed, 1st joint of hind tarsi as long as two following. Elytra parallel, rounded at tip and with a small spine near, but not on the suture. Length .70—.96 inch. = 17—19 mm. Hab. Cape San Lucas.

STROMATIUM, Serv.

Contains one species:

S. pubescens, Hald. (*Anoplum*) Trans. Am. Phil. X., p. 34; Lec. J.A.P. ser. 2, II, 1850, p. 16.

Pale yellowish brown; elytra robust subcylindrical, nearly parallel, entire at tip, uniformly pubescent; antennæ, elytra and feet unarmed. Length .58 inch. = 14.5 inch. Hab. Pennsylvania.

Spilosoma latipennis, Stretch.

By GEO. D. HULST.

June 7th this year captured a ♀ of the above species, from which eggs were obtained the same night. They differed from those of *S. virginica* in being of a dull white color.

The larva emerged June 13th. The body was white and very translucent, and loosely covered with long white hairs slightly sooty at the end. This with a greenish shading to the body, and an increasing sootiness to the hair remained till they reached the 4th moult.

After the 4th moult there was besides the dark shading, something of a red shading added to the long silky hairs giving a dirty reddish gray appearance.

After the 5th moult the larva was of uniform reddish brown color. The depth of color however varied in the different larvæ.

A year or two ago I raised a larva through the 4th moult, which remained pure white in color all through its history to that time. When full grown, the larvæ resemble very much the red brown larvæ of *S. virginica*.

The eggs were laid June 7th—8th; the larvæ emerged June 13th; 1st moult June 17th; 2nd moult June 20th; 3rd moult June 23rd; 4th moult June 26th; 5th moult July 1st. The larvæ began to form cocoon, which was after the fashion of its allies, July 8th.

I left for another part of the state at that time and by misfortune did not have a single one emerge.

Eggs were given to Mr. A. W. P. Cramer who also failed to raise them to maturity.

Note on Dynastes.

By J. DOLL.

Riding through "Hell's canon" in Colorado, I had the misfortune to break the stick used to urge upon my steed the necessity of motion—his motto seemed to be—no whip. no go. A substitute was absolutely necessary, and noticing a clump of mountain ash near a dry watercourse I dismounted, and cut a switch: looking about from force of habit, I noticed a large irregular dark clump near the tip of some branches; investigation revealed a *Dynastes* unlike any species that I have ever seen; further search resulted in the capture of a considerable number of other

specimens, and I afterward captured over 100, some of them fully four inches in length.

Prior to that time I had carefully searched for insects of this description without success; but now knowing their habits I found them or traces of their presence everywhere that the mountain ash was found. They are always found near the tips of branches, where by means of their projecting thoracic horn they scrape through the soft bark to cause a flow of sap which is very sweet, and of this consists their food. When discovered they were largely *in copulo* and a few days afterward though I found traces of their presence everywhere in the shape of scraped ash branches, yet not another beetle did I see.

This shows that the peculiarly modified thorax is not entirely without value to the insect. Unfortunately my entire collection of Coleoptera, the result of several months careful collecting was stolen on my way home, and I cannot therefore give the specific name of the insect, which however was probably new.

Notes on some Staphylinidae.

By GEORGE H. HORN, M. D.

Having had occasion to examine a series of *Edaphus*, having at hand the two types of *E. nitidus* Lec., the following result has been obtained. Of the two types one has two basal foveæ on one side and three on the other: is there the well marked median basal carina. The side on which there are but two foveæ is made so very evidently by the fusion of two of the foveæ. The second specimen and the one having the label is on each side trifoveate. The sutural stria of the elytra is fine but distinct. To this species *carinatus* Casey should be added as a synonym.

A certain number of specimens are irregularly foveate and I have seen one in which there were five foveæ, the three regular ones in a row and two nearly as large in front placed intermediately with the others.

On the other hand the transverse impression of the base of the thorax, in which the foveæ are situated becomes by degrees gradually less deep and the foveæ gradually smaller so that we notice a gradual disappearance of the carina which separates the two central foveæ and finally nearly an entire obliteration of it. Without intending to suggest the suppression of the species (*luculentus* Casey) founded principally on the obliteration of the median carina, I merely give my observation for the consideration of those who have still more material for study.

The carina at the base of the abdomen above is not on the "first segment" but on the first segment visible beyond the elytra.

Trogophloeus laticollis Lec. At first glance this species has the facies of an *Oxytelus* as remarked by Dr. Leconte. The type specimen (and unique) was obtained from the cabinet of the late Dr. Zimmerman, whose collection was made up of miscellaneous material from all parts of the world.

In examining the specimen I find the anterior tibiæ finely spinulose and the middle coxæ contiguous. It seems therefore to be *Haploderus* as originally described by Leconte and appears to be from Erichson's description and Duval's figure, uncomfortably close to *H. caelatus* of Europe. In any case the species is not a *Trogophloeus*.

LETTERS TO THE EDITOR.

THE FUTURE OF "PSYCHE".

To the Editor of the Bulletin of the Brooklyn Entomological Society.

Dear Sir.

In your issue for October 1884, vol. 7, p. 87 is a statement which misrepresents me and the position of *Psyche*, which I wish to correct, premising that I have no doubt the statement was made in good faith, and the misrepresentation unintentional.

You say "'Psyche' has a hard struggle for existence, but will not suspend just yet."

If *Psyche* ever suspends, it will not be because it has been worsted in the struggle for existence. It was never in better condition than this year, and I so stated at the meeting. The phrase "just yet" implies a contemplation of ultimate suspension, which is not and was not in my mind. The "struggle for existence" which you mention is a voluntary struggle. I could dispense with any public solicitation of support, as some of my colleagues have urged me to do, but I choose to distribute the support as widely as possible, that the entomologists of North America may look upon the work as theirs rather than the property of any restricted group of persons. Support, aside from subscriptions, has been contributed already by sixty persons, from seventeen States.

I made the proposition for a consolidation of entomological periodicals not entirely of my own initiative, was chairman of the committee which reported against it, and did not oppose the report, as my proposi-

tion was intended to afford an opportunity to others to profit by it, and not for any purposes of my own.

Respectfully,

B. Pickman Mann,

Washington, D. C., Nov. 24, 1884. Managing Editor of "*Psyche*".

Note by Editor. The sentence quoted by Mr. Mann from p. 87, in my original minutes, adopted by the Club, in Mr. Mann's presence, reads: "'Psyche' has a hard struggle but will not suspend just yet." The words, "for existence" do not appear in the original. Mr. Mann's language as written implies as he suggests: the remark as spoken, indicated that there was no present intention of suspending.

RHYSSA.

Dear Sir:

* * * *

While I am writing let me say that I made some remarks at the last meeting of the Washington Entomological Society regarding the discussion as to the phytophagous habit of *Rhyssa lunator* by Mr. Geo. Gade on p. 204 of the November Bulletin. There is nothing better established by previous observers than the parasitism of *Rhyssa*, and I have myself proved it many years ago and have found its larva actually preying on that of *Tremex*. That false statements have been made by previous writers in reference to it is true, since the *Rhyssa* does not sting the *Tremex* larva as is generally stated. The *Rhyssa* larva seeks its victim and lives attached to it on the outside. Prof. Lintner has recently published the facts as communicated to him by me in the *Country Gentlemen* for April 17th, 1884, as follows:

"I have on several occasions had opportunity of closely studying not only the mode of oviposition, but of larval growth of *Rhyssa*. My sketches and notes are at home (written from Boscawen, N. H.) but the salient facts bearing on your question, I can give from memory. In all instances where I have found the female depositing, it has been in trees infested with *Tremex columba*, and I have found her most numerous on badly affected or injured trees, or even on stumps or broken trunks, already partly decayed. The instinct to reach the egg or larva of *Tremex*, so dwelt upon in popular accounts, is imaginary. She bores directly through the outer part of the tree, and doubtless probes for a burrow; but her egg is consigned anywhere in the burrow; the young larva seeks its prey, and lives and develops without penetrating the body of its victim, but fastened to the exterior. This habit among parasites is much more common than is generally supposed. A great many *Rhyssa* larvæ doubtless perish without finding food, and a great many females die in probing for a burrow, especially where they saw through wood that is sound and hard".

C. V. RILEY.

Dear Sir:

Under the head of "Society News" in the last number of your Journal, Messrs. Gade, Hulst and Weeks give their views concerning the habits of this insect [*Rhyssa*]. An article furnished by me relating to this subject appeared in the "Canadian Entomologist" for December 1882, as contributing to the theory that this insect is not a parasite, and my observations concerning its habits have led me to hold views in agreement with the gentlemen named. The article appeared under the caption "Long stings" and an extract is as follows.

"My experience has demonstrated that while it may be a fact that these insects deposit their ova on the larvæ of the *Uroceridae* or other borers, they do not commonly do so. In every case that came under my observation, the long ovipositor, instead of penetrating through the burrow of a *Tremex* or other wood-borer, entered through wood that had not been previously attacked, and though I failed to discover the egg deposited, I am very much of the opinion that the deposition is oftentimes, if not generally made regardless of the contact with a larva. My observations were necessarily confined to such visitations from these insects as were made to a somewhat decayed stump of a beech tree, for though there were a number of oaks and other trees close by, their choice was for the beech, to which both species were constantly arriving and inserting their long ovipositors. At the close of each day I cut off, to the depth of six inches, such portions of the stump as had been attacked, but failed to detect in any of the cuttings either the burrow or larva of *Tremex* or other larva. I also noticed that the wood as exposed by such clippings as I had made, attracted the greatest number of these insects. I regard it therefor a matter of considerable doubt if either the *atrata* or *lunator* commonly deposit their ova in the body of wood boring larvæ, and it seems to me that if these ichneumon larvæ are carnivorous, they must possess the power of boring in search for their food. I do not suppose that these insects perform the great labor of inserting their long ovipositors upon the merest chance of meeting with a larva, but rather that they deposit their eggs at every insertion, my observations abundantly proving that they are not governed by any instinct in the selection of particular spots, so far as regards the presence of larvæ.

FREDERICK CLARKSON.

NOTE.—The foregoing letters of Prof. Riley and Mr. Clarkson were read at the November Meeting of the Society and provoked much discussion. None of the members had ever observed the matters mentioned

by Prof. Riley and on the contrary Mr. Gade is positive that many of the logs frequented by the *Rhyssa* are not infested by *Tremex* or other woodboring larva; further *Tremex* is rare, and *Rhyssa* very common. The chief object of the paper read by him was to call attention to the structure of the ovipositor; the reference to habit was made as an inference from observations purely of a negative nature and was given prominence by the agreement of the experiences of the members present. Positive evidence such as that furnished by Prof. Riley of course overbalances all *negative* observations. Still it would seem that a vast lot of unnecessary boring is done by *Rhyssa*, that the great majority of all eggs laid must perish, and that nature has dealt hardly with it in the way of instinct which in some other species in the same order is so wonderfully developed. Further observation will be made next season. J. B. S.

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Mr. Chas. Fuchs writes from San Francisco: "I am pleased as a child at the beginning of the collecting season here. The locality is said to be excellent. In San Matteo, Co., *Rosalia funebris* is found, as well as other pretty species. In Marin Co., one hours ride from here, I found a magnificent specimen of 4217 ♀; a beauty, two inches in length. *Amphicoma* I also found. I shall especially devote myself to collecting *Comiontis* which are common on the hills near the City. I am observing the larva of *Platyserus oregonensis* and hope to have some interesting notes for you in the course of the next few months."

It is a comfort to receive such a letter, even though it excite a mild sort of envy at our inability to take part in similar excursions and captures.

Mr. Ricksecker also writes from California. "Though it is December with us as well as with you, yet the more common sorts of butterflies are abundant, and we have had no frosts to amount to anything."

* * *

Mr. Henshaw sends good news for Coleopterists. He is preparing for the printer a new check list of N. A. Coleoptera and hopes soon to have it ready. Mr. Henshaw has been long at work upon a catalogue which is also fast nearing completion. Both works are sadly needed and Mr. Henshaw will earn the everlasting gratitude of Coleopterists if he will but let them have the books soon.

From Texas we received a considerable number of a large *Lycus* which Dr. Horn says is *L. Fernandezi* described from Mexico. The insect is an exaggeration of *cruentus*, and forms a notable addition to our fauna.

Mrs. C. H. Fernald sends with a label N. H. an insect doubtfully marked *Xylina tepida*, var. Comparison with European material proves it to be *Xylina ingriva*, H. Sch. The species must be added to our fauna if the locality is correct.

* * *

Dr. S. W. Williston of New Haven sends for publication a classification of the *Syrphidae* and writes: "I have had so many requests for information in regard to classification of *Diptera* that I have concluded to devote all my study the coming year to the preparation of synopses of the different families, excluding the family *Muscidae* in its widest sense."

This is good news and will, we hope, create an interest in this neglected order there are a few other neglected orders, and if some of the few gentlemen engaged in their study would follow Dr. Williston's example and send us papers on family and generic classification some of the amateurs, who now turn to Coleoptera and Lepidoptera because they can learn nothing of other orders, would become *Dipterists*, *Orthopterists* or *Hymenopterists*. Prof. Osborn has promised us a classification of *Hemiptera*, and Mr. Bruner one of *Orthoptera*. We shall try and stir up an *Hymenopterists*, *Neuropterists*, and if possible a student of the *Arcthiidae*.

* * *

The Bulletin is a little late this month, but that is the printer's fault. He says; Christmas and New Year come but once a year, while the Bulletin comes once a month. All sorts of concert programmes, cards, &c were shoved ahead of the "Bulletin", after it was half in type and partly printed. We are sorry it occurred, but take this opportunity of wishing all our readers a very happy New Year.

BOOK NOTICE.

Revision of the *STENINI* of America North of Mexico. "By Thos. L. Casey, Lieut. of Eng'rs, Member of the Entomological Society of France", pp. 206 and 1 plate. This paper we have received from the author. In it the *Stenini* are carefully studied, and 174 species belonging to our fauna are described, the great majority new. The descriptions are models of completeness--perhaps unnecessarily complete, because group characteristics are repeated in each description: the synoptic tables appear clear and Mr. Casey is careful to define the terms

used by him. Mr. Casey establishes the genus *Areus* for those forms in which the 4th tarsal joint is bilobed; but admits that it is perhaps unnecessary. He has had at least one predecessor who believed as he did. We quote Motschulsky (Bull. Mosc. 1860, I, p. 556 and 557: "Il me paraît juste de séparer les espèces à quatrième article des tarses bilobé comme genre particulier, de ceux qui l'ont simple et pour lesquelles on peut laisser le nom *Stenus*, tandis que pour les premières je proposerais celui de *Hemistenus*." *Areus* therefor is a synonym of *Hemistenus* Mots. and will probably not be recognized at present by American Coleopterists. As a whole, Mr. Casey's paper is a notable and desirable addition to our literature.

Society News.

Nov. 27th. — Twelve members present: Mr. Smith in the chair. Messrs. Angell and Beutenmuller, proposed at the October meeting were elected members of the Society. The proposition of the Ent. Soc. "*Iris*" of Dresden for an exchange of publications was accepted. Letters were read from Prof. Riley and Mr. Clarkson, *in re* the habits of *Rhyssa*, and those letters were discussed and ordered published.

"A note on *Dynastes*" by Mr. Doll was read by Mr. Smith, and offered for publication. Mr. Smith read a paper on "Species, Varieties and Races" which was offered for publication. Messrs. Hulst, Leng and Roberts joined in the discussion of the paper, Mr. Hulst thinks color in some cases may become a structural character, and structural characters—so called may prove less reliable than color. The variation in the venation of the Geometridæ was cited, and the presence and absence of spurs on the hind tibia of one of the same species was referred to. Still in the main he agreed with Mr. Smith's views. Messrs. Leng and Roberts favored a name to designate every decided and well distinguishable form, whether the peculiarity is in coloration or otherwise, they favored a name to express a definite idea of a combination of structure and color and when the variation reached a point at which the combination failed to accord with the idea expressed by the name, a new name should be given. Their views were to the point that not only genera, but species were artificial divisions established to aid recognition of forms, and incapable of being absolutely limited.

Mr. Gade exhibited some specimens of wings bleached by the process suggested by Prof. Marsh for bleaching microscopic sections. i.e. by chlorine gas generated by hydrochloric acid or chloride of potash and led from the jar in which it is generated, into another, half filled with water. The result is excellent; but the time required is much greater than by the "Dimmock" process.

A proposition was made to change the evening of meetings to Tuesday, as many members were unable to attend on Saturday evening. Mr. Leng was directed to prepare a suitable resolution for the amendment of the by laws and it is desired that members send in their views concerning such change.

Dec. 29th.—Twenty-one members and visitors present, the President in the chair. Reports from the Executive and Publications Committee were presented; and also a notice that a motion for an amendment to the by-laws changing the night of meeting to the first Tuesday of each month, would be made at the next

meeting by Mr. Leng. A committee of five was appointed to secure the incorporation of the Society. A further committee of five was appointed to try and arrange for an combination with "Papilio" to produce a monthly journal of general Entomology, to be published by the Society. Both committees to co-operate in a scheme for the establishment of a permanent fund to support such journal.

Mr. Richard F. Pearsall of Brooklyn was proposed as a member of the Society by Mr. Weeks.

Mr. Curley read a paper "On the differentiation into females, males and workers, of bees and other hording insects." Mr. Curley starts from a primitive solitary bee with a developed hording instinct. He shows how severe labor in providing for offspring will injuriously affect the reproductive powers, and also that insufficient nurture in the larva state will result in the greater or less imperfection of the same powers. He claims that these organs are the ones first affected by adverse circumstances, and last to be developed. From these facts he supposes a season of want, or other inability of the parent adequately to provide for all her offspring in the larval state. The severe labor of the mother and inadequate food of the larva would inevitably tend to produce imagines more or less imperfect, and the reproductive organs, as least essential to the life of the insect would be the first to suffer. In the ♀ the power of reproduction would be largely lost, yet, yet the hording instinct would be transmitted; and, unable themselves to found colonies, these imperfect females cling to their home, and labor for its common benefit. The result is, that the mother bee largely relieved of the care of providing food is better able to procreate her kind, and the larvæ, better feed, are more fully developed. These fully developed insects, of course themselves found colonies; but in competing with the worker community are at a disadvantage. Mr. Curley interestingly shows how by accumulation of experiences, and a transmission of instincts the present community of hive bees became established. The effect of food on the development of insects was discussed and the habits of the bees in creating queens from worker larvæ was detailed.

Extended discussion followed this paper in reference to the effect of lack of food upon the colors and maculation of insects in general. Mr. Weeks gave account of a brood of *antiopa*, which though neglected in every possible way, still managed to reach the imago state, but were not only very small in size; but very aberrant in maculation. Especially the band of blue spots within the yellow marginal band was often absent, and often but faintly indicated, seldom entirely complete. Mr. Frank cited the effect of food plant upon the colors of *Cecropia*, and other members joined in the discussion. Informal discussion and exhibition of specimens followed until the Society adjourned.

A. C. WEEKS, Rec. Secy.

Members are hereby notified that at the January 1885 meeting, a proposition to incorporate the Society will be acted upon. and that a plan to extend the scope and usefulness of the Society and making non residents eligible to membership will be discussed. Officers for the ensuing year will also be elected, and members are earnestly requested to attend.

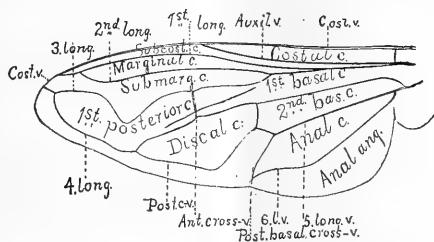
C. H. ROBERTS, Corr. Secy.

On the classification of North American Diptera.

(First paper.)

By DR. S. W. WILLISTON.

It is proposed here, in order to render the study of the neglected order of diptera less difficult, to present tabular synopses of the families and genera, with remarks upon their structure and external characters. The work involved is necessarily very great, and the families cannot at present be given in their natural sequence. The next paper will shortly be ready, containing a classification of the *Xylophagidae* and *Stratiomyidae*, and some time during the year will follow one giving a tabular classification of the families, with plates showing the more important structural characters. The present paper is extracted from a monograph of the North American *Syrphidae*, now ready for the press. It is the result of a careful study of nearly two hundred and seventy five species, occurring within our limits. The following figure will explain sufficiently the terms here used; a discussion of the terminology of the order will accompany the paper on the family classification.



CHARACTERS OF THE FAMILY SYRPHIDAE.

A false longitudinal vein between the third and fourth longitudinal veins; fourth longitudinal vein united at its extremity with the third; one submarginal cell, three posterior cells; basal cells large; face without subantennal grooves; two pulvilli.

Head hemispherical, often elongated or produced in the lower part, as broad or a little broader than the thorax. Face moderately broad, bare, or clothed with short pile or dust, excavated in profile under the antennae and projecting below, or with a distinct protuberance near the middle part; never with longitudinal furrows or lateral ridges, usually convex transversely, sometimes with a median ridge. Oral opening large; proboscis rarely much elongated, usually but little projecting, and, when

at rest, concealed within the mouth; palpi one-jointed; labrum, epipharynx, hypopharynx, maxillæ and labium present. Front never excavated, often swollen, sometimes with a more or less elongate process which bears the antennæ. Antennæ usually porrect, approximate at their base, three-jointed, the third joint more especially of varied shape, usually flattened and with a dorsal bristle, either bare or plumose; very rarely the third joint is not flattened, and is provided, at the tip with a terminal style. Eyes large, bare or pilose, in the male usually contiguous between the base of the antennæ and ocelli. Ocelli always present. Thorax comparatively large and robust, moderately arched above; scutellum large, hemispherical, often translucent, rarely furnished with spines on its border. Abdomen composed of five or six visible segments, rarely with only four. Hypopygium usually not prominent. Shape of the abdomen very various; slender, linear, clubbed, short, oval, and all intermediate forms. Legs usually weak, sometimes strong; the hind femora not infrequently moderately or much thickened, the hind tibiæ not rarely arcuated and compressed, metatarsi rather long, coxæ short; the hind coxæ, femora and tibiæ, more especially in the male, in not a few species armed with spurs, protuberances, or spines. Macrochatae rarely present in any part of the body; the body generally thinly pilose or nearly bare, but sometimes clothed with thick pile. Wings comparatively large, when at rest folded together over the abdomen, or half open; third longitudinal vein never forked, frequently with a more or less deep curvature on the outer part; marginal cell open or closed, the fourth vein terminates in the third vein at or before the tip; neither of the intercalary veins present; anal cell always closed before the border of the wing; small cross-vein before or beyond the middle of the discal cell; *between the third and fourth longitudinal veins and nearly parallel with them there is a false or spurious vein*, nearly always present, and characteristic of the family.

SYNOPTIC TABLE.

- A.—Anterior cross-vein of the wings distinctly before the middle of the discal cell, usually straight and rectangular; third longitudinal vein rarely with a distinct curvature into the first posterior cell; hind femora usually slender, rarely thickened.
- B.—Third joint of antennæ with a terminal style.....**Cerinae.**
- BB.—Antennæ with a dorsal bristle.
- C.—Marginal cell of the wings open, i.e. the second longitudinal vein terminates in the costa.
- D.—Antennæ longer than the head, rather large species.....**Microdoninae.**
- DD.—Antennæ as long or shorter than the head.

- E.*—Abdomen with only four visible segments..... **Pipizinae.**
EE.—Abdomen with five or six visible segments.
F.—Face rounded, receding, not tuberculate, pilose.....**Pipizinae.**
FF.—Face tuberculate, or at least the oral margin in front is not receding but more or less produced.
G.—Front long, much narrowed above in the female, cheeks narrow, face considerably narrowed below, abdomen frequently contracted beyond the base, more or less slender.....**Bacchinae.**
GG.—Face widest below, or at least but slightly narrowed.
H.—Abdomen in outline linear or oval, never narrowed beyond the base, that is in outline not club-shaped.
I.—Color chiefly reddish or lutescent.....**Brachyopinae.**
II.—Color not chiefly reddish or lutescent.
J.—Metallic green, metallic green and black, or black species, rarely with luteous markings at base of abdomen, humeri and face; abdomen never with entire shining cross-bands....
Chilosinae.
JJ.—Black or greenish black species with yellow or yellowish stripes or bands, or at least with entire shining cross-bands on abdomen.
K.—Face black; abdomen usually slender, with yellow or greenish yellow interrupted cross-band....**Melanostominae.**
KK.—Face partly or wholly yellow; abdominal markings yellow.
L.—Dorsum of thorax with yellow lateral stripes.....
Xanthogramminae.
LL.—Dorsum of thorax without yellow lateral stripes....
Syrphinae.
HH.—Abdomen contracted beyond the base, in outline more or less club-shaped; small species.....**Ascinae.**
CC.—Marginal cell of the wing closed and petiolate.....**Volucellinae.**
AA.—Anterior cross-vein near or beyond the middle of the discal cell, usually oblique, the hind femora frequently thickened.
M.—Antennæ with a dorsal bristle.
N.—Third longitudinal vein bent deeply into the first posterior cell.
O.—Marginal cell closed and petiolate....**Eristalinae.**
OO.—Marginal cell open.....**Mallotinae.**
NN.—Third longitudinal vein, only gently curved.
P.—Arista plumose.
Q.—Marginal cell closed.....**Volucellinae.**
QQ.—Marginal cell open.....**Sericomyinae.**
PP.—Arista bare or pubescent.
R.—Thorax with distinct yellow markings.....
Milesinae.
RR.—Thorax without yellow markings.....
Xylotinae.
MM.—Antennæ with a terminal style.....**Cerinae.**

MICRODONINAE.

Anterior cross-vein near the base of the discal cell, or near the middle, and more or less oblique. Marginal cell of the wing open. Legs slender. Femora not thickened. First and third joints of the antennæ elongate, the second more or less so. Large species.

- A.—Scutellum thickened, usually with two points; face rounded, not tuberculate, pilose; without distinct yellow markings. **Microdon**, Meig.
 AA.—Face produced downwards, obtusely convex on lower part, yellow with black median stripe; third longitudinal vein with a distinct curvature: thorax with lateral yellow interrupted stripes; abdomen banded. (*Chrysotoxum*).

PIPIZINAE.

Anterior cross-vein near the base of the discal cell, rectangular, the third vein usually straight, antennæ a little elongated or short; marginal cell open; face rounded or tuberculate, receding above the oral margin; mostly small, nearly bare, finely punctulate species, with short, oval abdomen; hind femora rarely somewhat thickened.

- A.—First and second joints of antennæ very short, the third large, subquadrate, with a sub-terminal arista; abdomen very convex, the venter deeply excavated. . . . **Nausigaster**, Will.
 AA.—First two joints of antennæ not unusually shortened, the arista basal, eyes pilose.
 B.—Face evenly rounded, not at all projecting in profile, dark, without yellow, pilose. **Pipiza**, Fall.
 BB.—Face somewhat tuberculate below, partly or wholly yellow; abdomen oval, obtusely rounded behind; finely punctulate, black or black and red, not banded. **Paragus**, Latr.

CHILOSINAE.

Small to moderately large species, never with light markings other than luteous spots sometimes present at the base of the abdomen, scutellum, lower part of the face, etc.; usually the color is uniformly black, with or without metallic greenish markings or wholly deep shining black, the abdomen never with entire cross-bands of any kind. Antennæ elongate or short, the face with a distinct tubercle, or if not, the oral border in front is projecting; abdomen oval, never elongate or club-shaped; marginal cell of wings broadly open, third longitudinal vein nearly straight, anterior cross-vein near the base of discal cell.

- A.—Hind femora distinctly thickened.
 B.—Antennæ elongate; body clothed with sparse tomentum; all the femora thickened and with a row of short spines below. **Lepidomyia**, Loew.
 BB.—Antennæ short, all the femora not thickened.

- C.*—Scutellum unusually large, nearly square in outline; eyes of male separated by the ocellar tubercle. **Chalcomyia**, n. g.*
- CC.*—Scutellum not unusually large, considerably broader at the base; eyes of male contiguous. **Myiolepta**, Newm.
- AA.*—Hind femora slender.
- D.*—Face and front never with transverse wrinkles.
- E.*—Epistoma produced, face without tubercle. **Psilota**, Meig.
- EE.*—Face tuberculate, the oral margin never protuberant. . . . **Chilosia**, Meig.
- DD.*—Front in female, or the face in both sexes also with transverse wrinkles; hind border of scutellum sharp; false vein of wing usually obsolete . . . **Chrysogaster**, Meig.

MELANOSTOMINAE.

Small, elongate, thinly pilose species, deep black or shining green, the abdomen usually slender, with interrupted bands of bright yellow, orange or greenish yellow color (*Syrphus simplex* from the West Indies has a black face and entire shining metallic abdominal cross-band); face uniformly black, or at least never with light ground-color. Antennæ short, face tuberculate, marginal cell of wing open, third longitudinal vein of wing only gently curved, anterior cross-vein near the base of discal cell; legs slender, hind femora never thickened.

- A.*—Wings not longer than the abdomen; ocellar tubercle large, prominent; abdomen depressed, long, elliptical, somewhat narrowed toward the base, the lighter markings ferruginous or orange-yellow. **Pyrophæna**, Schiner.
- AA.*—Wings longer than the abdomen; ocellar tubercle not unusually large; abdomen more slender, the cross-bands yellow or greenish yellow, sometimes shining metallic.
- B.*—Front tibiæ and metatarsi of the male dilated, those of the female slightly widened. **Platychirus**, St. F. & Serv.
- BB.*—Front tibiæ and metatarsi in both sexes slender, not widened.
- C.*—Distance between the eyes below less than in the middle of the face, front of female considerably narrowed above (*Baccha*).
- CC.*—Eyes not convergent below **Melanostoma**, Schiner.

BACCHINAE.

(To this group but a single genus is referred. Some species belonging under *Melanostominae* may be sought for here; the long front, extremely narrowed cheeks with the width of the face being conspicuously less below will distinguish those species belonging here in which the abdomen is not elongate and club-like. Moreover, such species are chiefly from the West Indies and Central America.)

- A.*—Wings with dark markings, or the abdomen very slender. **Baccha**, Fab.

* Type, *Myiolepta æra* Loew.

XANTHOGRAMMINAE.

Mostly elongate, small, thinly pilose species, deep shining black or shining green, with bright yellow markings on face, lateral dorsal margins of thorax, and abdomen. Antennæ short, face tuberculate; marginal cell of wings wide open, third longitudinal vein only slightly curved, small cross-vein near the base of discal cell; legs slender; hind femora rarely thickened (*Mesograptæ*).

A.—Eyes of male with an area of enlarged facets above; fourth segment of abdomen in both sexes with two yellow median stripes and an oblique spot on each side....

Allograptæ, O. S.

AA.—Eyes of male wholly without an area of enlarged facets above; fourth segment of abdomen fasciate.

B.—Ocelli situated near the vertex; abdomen oval, of six visible segments; thorax without median dorsal cinereous line.....*Xanthogramma*, Schiner.

BB.—Ocellar tubercle remote from the vertex; slender species.

C.—Dorsum of thorax with a median cinereous line.....*Mesograptæ*, Loew.

CC.—Dorsum of thorax without such line.....*Sphærophoria*, St. F. & Serv.

SYRPHINAE.

Rather large species*, black or greenish black, usually with yellow abdominal bands; the face always wholly or in part yellow, the dorsum of thorax without yellow lateral stripes; moderately pilose. Marginal cell of wing wide open, third vein rarely (*Didea*) curved into the first posterior cell, anterior cross-vein near the base of discal cell. Antennæ short, face tuberculate**, abdomen oval, rarely elongate, never club-shaped; legs slender, hind femora never thickened.

A.—Thickly pilose species; abdomen quite oval, broader beyond the middle. Basal portion of abdomen yellow, terminal portion black, wings with a dark spot.....

Leucozona, Schiner.

AA.—Rather bare species; abdomen with yellow bands, either all entire or one or all interrupted.

B.—Hind femora extraordinarily thickened. (*Syritta*).

BB.—Hind femora not thickened.

C.—Eyes of male with an area of enlarged facets above; front very convex; hypopygium very small.....*Catabomba*, O. S.

CC.—Eyes of male without an area of enlarged facets above; front moderately convex; hypopygium not very small.

* Species of *Paragus* (*Pipizinae*) will be sought for here; they are small, finely punctulate, nearly bare, with or without the abdomen more or less red.

** If the face is concave, from antennæ to oral margin, and the hind femora very much thickened compare *Syritta* (*Xylotinae*).

- D.*—Sixth abdominal segment of the male as long as the two preceding together, but narrower, somewhat tubular, unsymmetrical: on underside of the seventh segment with two long, linear, sub-parallel appendages, arcuate, bidenticulate at the end, imbedded in grooves when at rest. In the female the fifth segment half as long as the preceding. Scutellum much raised, exposing metanotum..... **Eupeodes**, O. S.
- DD.*—Hypopygium without slender appendages, sixth segment of male not peculiar; fifth segment of female one third or one fourth as long as preceding segment.
- E.*—Third longitudinal vein with a distinct curvature into the first posterior cell; third joint of the antennæ elongate-oval..... **Didea**, Macq.
- EE.*—Third longitudinal vein straight or gently curved; third joint of antennæ short oval..... **Syrphus**, Fabr.

ASCINAE.

Small, slender, elongate, thinly pilose species, with more or less yellow markings on head and abdomen. Antennæ short, epistoma produced; marginal cell of the wings open, third longitudinal vein straight or gently curved, anterior cross-vein near the base of the discal cell and rectangular, abdomen contracted towards the base, the greatest width beyond the middle, in outline club-shaped or spatulate; hind femora thickened.

- B.*—Epistoma produced anteriorly, in profile deeply concave from antennæ to tip; third joint of antennæ nearly orbicular..... **Sphegina**, Meig.
- BB.*—Epistoma produced more downward, in profile slightly concave from antennæ to tip..... **Ascia**, Meig.

BRACHYOPINAE.

Moderate sized, nearly bare species, chiefly or wholly reddish or luteous; or, if in large part black, without light yellow markings. Antennæ short, abdomen not club-shaped; anterior cross-vein before middle of the discal cell, marginal cell wide open.

- A.*—Epistoma produced into a long slender porrected snout; femora slender; the third longitudinal vein joins the costa beyond the tip..... **Rhingia**, Scopoli.
- AA.*—Face not so produced, hind femora more or less thickened.
- B.*—Face carinate, abdomen oval..... **Brachyopa**, Meig.
- BB.*—Face produced, obtusely tuberculate, thorax with bristles, abdomen elongate
Eugeniomyia, Will.

VOLUCELLINAE.

Mostly large species, uniform in color or variable. Third joint of the antennæ more or less elongate, the arista always pilose; eyes usually pilose; body nearly bare or thickly pilose; abdomen short, thick, strongly convex above; legs slender, marginal cell of the wings closed and petio-

late, third longitudinal vein gently curved, the fourth vein joins the third a considerable distance before the tip; anterior cross-vein usually near the base of discal cell; legs slender, hind femora never thickened.

A.—Arista very densely plumose, appearing like a solid mass....**Copestylum**, Macq.

AA.—Arista feathery plumose.....**Volucella**, Geof.

ERISTALINAE.

Large species, uniform in color or more or less variegated, thinly or thickly pilose; third joint of antennæ short, arista bare or thinly pilose; abdomen short, broad, arched; hind femora sometimes much thickened; marginal cell of wings closed and petiolate; third longitudinal vein with a deep concavity into the first posterior cell; anterior cross-vein near or beyond the middle of the discal cell, oblique.

A.—Thorax never with yellow spots.

B.—Frontal triangle of male strongly protuberant...**Doliosyrphus**, Bigot.

BB.—Frontal triangle of male evenly arched.....**Eristalis**, Latr.

AA.—Thorax with yellow spots.

C.—Hind femora without a projection below.....**Pteroptila**, Loew.

CC.—Hind femora with a projection below near the end. (*Milesia*.)

MALLOTINAE.

Mostly large, thickly pilose species; antennæ short*; the third joint not longer than broad, arista basal, bare; hind femora thickened; marginal cell of wings open, third longitudinal vein deeply curved into the first posterior cell, anterior cross-vein at or beyond the middle of discal cell, oblique; hind femora thickened.

A.—Arista plumose (*Sericomyinæ*).

AA.—Arista bare.

B.—Face with a longitudinal ridge in the middle; hind femora strongly thickened and with an angular protuberance below, near the end.....

Tropidia, Meig.

BB.—Face not distinctly carinate; tuberculate or rounded.

C.—Hind coxæ and tip of hind tibiæ in the male with spurs; eyes of male broadly separated.....(*Polydonta* ||) **Triodonta**.

CC.—Hind coxæ and tip of hind tibiæ in the male without such spurs, or if so, the abdomen is elongated and cylindrical.

D.—Thorax and scutellum very densely pollinose above; the face in the male more tuberculate than in the female.....**Pterallastes**, Loew.

DD.—Thorax and scutellum not densely pollinose above.

E.—Third joint of antennæ broad, thorax not vittate.

F.—Thickly pilose.....**Mallota**, Meig.

* *Chrysotoxum* may be sought for here; the antennæ are elongate, and the dorsum of the thorax has yellow lateral stripes.

FF.—Thinly pilose, hind tibiæ in the male with an internal, median spur

Teuchocnemis, O. S.

EE.—Third joint of the antennæ ovate; thorax usually with distinct stripes: eyes of male broadly separated. *Helophilus* Meig.

SERICOMYINAE.

Large species; antennæ short, the third joint scarcely longer than broad; arista basal, plumose; anterior cross-vein of wings oblique, near the middle of discal cell; hind femora sometimes thickened.

A.—Moderately pilose; abdomen with yellow interrupted cross-bands, third longitudinal vein never considerably curved. *Sericomyia*, Meig.

AA.—Thickly pilose, abdomen uniformly black; third longitudinal vein considerably curved. *Arctophila*, Schiner.

XYLOTINAE.

Anterior cross-vein near or beyond the middle of the discal cell; arista dorsal, bare; third longitudinal vein only gently curved, marginal cell open; thorax without yellow markings other than sometimes on the humeri.

A.—Long, slender, abdomen narrowed toward the base (*Baccha*).

AA.—Abdomen never linear or club shaped.

B.—Nearly bare species, especially on the abdomen, the pile never long or dense; eyes bare.

C.—Face strongly carinate; hind femora thickened, with an angular protuberance below near the end. *Tropidia*, Meig.

CC.—Face not carinate.

D.—Third segment of the abdomen in the male very much contracted, cylindrical, the hind femora much thickened, with a bifid spine below at the tip. Eyes very large, face small. *Senogaster*, Macq.

DD.—Hind femora more or less thickened, with spines or bristles below, never with a bifid spine near the tip.

E.—Hind femora very much thickened, anterior cross-vein rectangular. . . . *Syritta*, St. F. & Serv.

EE.—Hind femora never remarkably thickened, hind coxæ often with spinous process; cross-vein always oblique. *Xylota*, Meig.

BB.—Large pilose species, the abdomen always abundantly pilose.

F.—Scutellum, margin of thorax and pleuræ with bristly hairs; face distinctly tuberculate; femora slender, abdomen without yellow markings. *Chrysochlamys*, Rond.

FF.—Thorax wholly without bristly hairs.

G.—Face short, not produced, concave from antennæ to tip, not tuberculate, transversely arched; hind femora more or less thickened.

H.—Abdomen elongate. *Brachypalpus*, Macq.

HH.—Abdomen very broad, thorax densely pilose, very large species. *Pocota*, St. F. & Serv.

GG.—Face produced, longer than the front.

- I.*—Face produced forward, pointed, concave from the antennæ to tip, not tuberculate, sub-carinate, eyes of male contiguous or nearly so in front of ocellar tubercle; hind femora thickened, abdomen without yellow markings. **Crioprora**, O. S.
- II.*—Face not evenly concave, tuberculate.
- J.*—Third joint of antennæ produced above into a conical process, terminating in the thickened arista; femora not thickened. **Merapioidus**, Big.
- JJ.*—Third joint of antennæ transversely oval, but little broader than long; femora rarely thickened. **Criorrhina**, (Meig.) Macq.

MILESINÆ.

Large species, thinly pilose or nearly bare, with yellow spots or lateral stripes on the thorax above. Anterior cross-vein at or beyond the middle of discal cell and oblique; third longitudinal vein usually only gently curved; arista dorsal, bare; hind femora moderately thickened and elongate.

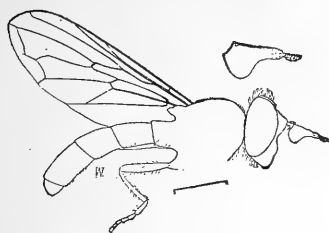
- A.*—Hind femora with a conical protuberance below near the end.
- B.*—Marginal cell of wing open; antennæ more or less elongated. **Spilomyia**, Meig.
- BB.*—Marginal cell closed and petiolated; antennæ short. **Milesia**, (Latr.) Fabr.
- AA.*—Hind femora without such protuberance; marginal cell open.
- C.*—Dorsum of thorax with yellow lateral interrupted stripes; third joint of antennæ elongate. **Chrysotoxum**, Meig.
- CC.*—Dorsum of thorax not so striped; third joint of antennæ not elongate.
- D.*—Antennæ inserted high up on a conical projection, front short, face much produced downward; antennæ longer or shorter than the head. **Sphecomyia**, Latr.
- DD.*—Antennæ short, situated low down, near the middle of the head in profile, face not longer than the front. **Temnostoma**, St. F. & Serv.

CERINÆ.

- A.*—Rather large, elongate species, nearly bare; antennæ longer than the head, second and third joints swollen, terminating in a short thickened style; third longitudinal vein strongly angulated, emitting a stump of a vein into the first posterior cell. **Ceria**, Fabr.
- AA.*—Small species, nearly bare, not elongate; first two joints of the antennæ very short; third elongate, dilated below near the base, and with a short thickened style. **Pelecocera**, Meig.

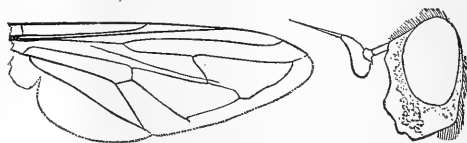
* * *

There is doubt about the determination of one of the above genera, M. Bigot, claiming (Wien. Ent. Zeit. vol. iii. pp. 217, 320) that what I have named *Euceratomyia* is the same as his genus *Merapioidus*. If

*Pelecocera.*

striking, is scarcely of generic value, at least as long as the genus *Pelecocera* contains so few species. In size, coloration, and structure, other-

wise, my species *P. pergandei* fully agrees with some of the species placed in the genus. Now if Mr. Bigot is right, his genus

*Merapioidus.*

Merapioidus is a synonym of *Pelecocera*; but I will await further evidence before assuming that he is, and I must here defend this genus. It is quite unnecessary to point out the differences between *Pelecocera* and what I here call *Merapioidus*, a genus whose typical species is of about the size and shape of an *Eristalis*; there is scarcely any resemblance.

All the known genera from the United States have been examined. Some supplementary notes will be given in the next paper.

M. AUG. CHEVROLAT.

We are sorry to learn from M. A. Sallé, of the recent decease of that eminent coleopterist, in the 86th year of his age. M. Chevrolat was well and favorably known wherever Coleoptera were studied, and he worked at his favorite science with an energy and versatility peculiar to his nation. In 1862 Dr. Hagen enumerates 91 articles as from his pen, and M. Chevrolat has not flagged in his efforts since. One by one the men eminent in our favorite science drop off, leaving however their mark in the classification of the order upon which they worked.

SOCIETY NEWS.

Jan. 31st.—Twenty members present. Prof. Fillon visitor. Mr. Richard F. Pearsall was elected a member of the Society. The report of the Committee on Incorporating the Society was made, relating that the necessary legal steps had been taken and proper papers filed. On motion the report of the committee was adopted, and all the members present subscribed a certified copy of the certificate of incorporation as original members. Eight others had signified their

intention to subscribe as original members as soon as they could attend a meeting of the Society, and it was resolved to give all the present members the privilege of signing on their next attendance. The further proceedings were carried on under the articles of Incorporation, Mr. John B. Smith in the chair. The committee on a union of *Papilio* with the Bulletin, reported in favor of such union, and recommended that a monthly Journal to consist of not less than 20 pages be issued, to be called "*Entomologica Americana*", Subscription price to be \$2 00 per annum. They reported that it had been provided in the by-laws that a publication fund should be established and Mr. B. Neumoegen had offered \$100 per annum toward defraying the cost of the new Journal. They further reported that a sub-committee had been appointed which had conferred with Messrs. Aaron and Edwards in reference to back volumes of *Papilio*. Mr. Neumoegen had released to the Society all his claim on Vols. I, II & III, and Mr. Edwards had agreed to do the same, on condition of being elected a life member of the Society. With Mr. Aaron a similar arrangement was made, so that the Society was in the most favorable position possible to successfully publish the combination Journal, which was to cover the whole field of Entomology. On motion the report of the Committee was afterward adopted, their acts and agreements ratified, and the Committee discharged.

The Committee on By-Laws reported that they had prepared a draft, which was submitted, discussed, and with some slight amendments adopted, and the Committee discharged.

The election of Officers was then proceeded with, with the following result, President, A. W. P. Cramer; Vice Pres., Edward L. Graef; Treasurer, C. H. Roberts; Corr. Secy., and Editor, John B. Smith; Rec. Secy., A. C. Weeks; Librarian, Geo. D. Hulst; Curator, Chas. W. Leng; Executive Committee, A. W. P. Cramer, C. H. Roberts, B. Neumoegen, John B. Smith, Geo. D. Hulst, Edward L. Graef and Fred. Tepper; Publication Committee, John B. Smith, Hy. Edwards, B. Neumoegen, Edward L. Graef and Fred. Tepper.

On motion the Certificate of Incorporation and By-Laws were ordered published.

On further motion it was resolved, that, the new by-laws providing that the meetings of the Society be held on the first Tuesday of each month, and the first Tuesday of February being at hand, the next meeting be held on the first Tuesday of March.

A communication was read reporting the establishment of an Entomological Society at Newark, N. J. On motion the Secretary was directed to convey to the new Society our best wishes for its success. A large number of Publications were received; but owing to the lateness of the hour all further business was laid over until the next meeting.

* * *

Members are hereby notified that the next meeting of the Society will be held on the first Tuesday of March next, at 8 P.M. Such members as have not yet subscribed the certificate or given notice of their intention so to do, will please attend that meeting, or communicate with the Secretary as soon as possible in order that the roll of original members may be completed.

An Introduction to a Classification of the N. A. Lepidoptera.

(Continued from p. 83.)

In the last paper was given a brief review in synoptic form of the classification of the Lepidoptera as a whole. The present paper is devoted to the RHOPALOCERA.

In this assemblage of forms, characterized by antennæ which are clavate at tip, a lack of ocelli, want of the frenulum in both sexes, and diurnal habits, two distinct structural types are observable; the true Butterflies, and the *Skippers* or *Hesperids*. The latter are characterized by the very broad, short head, and the situation of the antennæ, which are as widely separated as the width of the head will allow. Their robust body, strong, often rather hairy wings, usually small size, and short jerky manner of flight renders them recognizable at a glance. At rest the primaries are elevated, the secondaries extended horizontally. Some exotic forms (*Thanaos tages*) when asleep, fold both pair of wings as do the *Bombycids* and *Noctuidæ*.

The *Papiliones* or true butterflies have both pairs of wings elevated when at rest, the head is comparatively smaller than in the *Hesperids*, though in some *Nymphalidæ* of good size, and the antennæ are situated rather close together near to the middle of the vertex.

In Vol. VI of the "Bulletin" pp. 37—45 I gave a synoptic table of the genera of the *Rhopalocera*, and that should be consulted by the student in connection herewith. In that paper I followed Mr. Edwards' catalogue in the arrangement of families, placing the *Papilionidæ* at the head of the list. Since that time I have had an opportunity of more closely examining large collections of that family and the result is that I have become convinced that the *Nymphales* represent a higher type than the *Papiliones* and should be catalogued before them in the list. The diagram given by Mr. Scudder in the Tr. Am. Ent. Soc., Vol. VI, p. 73, seems to express very nearly the true relationship of the forms, and after verifying the structural characters referred to by him, I fully concur with his results

The table on page 38 should therefore be modified as follows:

Imago with but four fully developed legs; anterior more or less aborted in at least one sex.

Anterior tarsi aborted in both sexes; tibia weak, in ♂ brush-like, Chrysalis angular.

Suspended by the tail. **Nymphalidæ.**

Anterior tarsi of ♂ aborted, tibia brush-like; of ♀ complete, but weak. Wings often thinly covered with scales. **Erycinidæ.**

Anterior tarsi of ♂ apparently complete, often ringed; but usually exarticulate and never with claws at tip. Chrysalis subulate; girthed at middle....**Lycaenidae.**
 Imago with six complete legs in both sexes.

Head moderate; antennæ approximate at base, not hooked or acutely terminated at tip. Chrysalis usually angular, girthed at middle.....**Papilionidae.**

Head broad; antennæ widely separated at base; usually hooked or acutely terminated at tip. Larva often pupating in a cocoon.....**Hesperiidae.**

The true relations of the families cannot be accurately expressed in cataloguing; but referring the student to Mr. Scudder's excellent paper and the diagram on p. 76 thereof for further information, the four-footed butterflies will here be all considered together.

The *Nymphalidae* are represented in our fauna by five sub-families, viz. *Heliconinae*, *Danainae*, *Nymphalinae*, *Satyrinae* and *Libytheinae*.

Various orders are adopted in cataloguing, some placing the *Satyrinae* at the head of the list, while others accord to the *Danainae* that rank. Except in the one point,—the place of the family itself,—we prefer Mr. Edwards' arrangement of the sub-families and genera, and will consider them in the order above named.

The synopsis of sub-families need not be here repeated; the student is supposed to have that in the 6th Vol. at hand.

The *Heliconinae* are essentially tropical butterflies, and the few species found in the Southern States are not all at home there; but have come from the West Indies or Mexico. The sub-family is distinguished from all the other four-footed butterflies by having the secondaries excised at inner margin, so that there is no groove for the reception of the abdomen. The antennæ are long, the wings rather narrow and elongate, often more or less hyaline, and usually very brightly colored.

The typical genus *Heliconia* is represented in our fauna by a single species, *charitonia*, which is black, and ornamented with three more or less complete, irregular, yellow bands on primaries, and two on secondaries.

The *Danainae* are represented by the typical genus *Danais*, well known to most collectors all over the world; our *archippus* is common everywhere, and can almost claim the title cosmopolitan. The genus is distinguished by the five branched subcostal nervure, and the distinctly closed cell. The secondaries are not excised; but are modified at the internal margin so as to form a groove for the reception of the abdomen. In the males there is a peculiar black raised spot on vein two of the secondaries.

The *Nymphalinae* are represented in our fauna by numerous genera,

not very well marked structurally considered; but very evidently characterized by a peculiar style of maculation which renders them easily recognizable. The table on p. 41 of Vol. VI is perhaps as good an arrangement for their distinction as can be at present devised.

Colaenis has the discal cell of primaries closed, of secondaries open; the tibiæ are not spinose. The wings are elongate, rather narrow, reminding one of *Heliconia*, tawny in color above and beneath; without silvery spots.

Agraulis has the same general appearance; but is much wider winged, the primaries still drawn out at apex; tawny in color, spotted above with black, and beneath marked with elongate silvery blotches on secondaries and at apex of primaris. The tibia are spined, else the genus is structurally like the preceeding. *A. vanillae* is very common in the Southern States.

Argynnis is very largely represented in our fauna, and very many species have been described. They are usually moderate in size, tawny in color, maculate with black above, and usually with silver on secondaries beneath. The maculation is all after the same type, and a species once seen. all other representatives of the genus can be recognized at a glance. The discal cell of both wings is closed.

Euptoieta resembles *Argynnis* in maculation above, but lacks the silvery spots beneath. The primaries are broader, produced at apex, and somewhat excavated above middle of outer margin. The discal cell of secondaries is open.

Diadema is large, with some resemblance to *Danaüs*; but the discal cell of secondaries is open. The primaries are fulvous above, black toward apex and with an oblique white band crossing this dark space.

Melitaea and *Phyciodes* substantially agree in maculation, and are often considered identical. Above, they resemble miniature *Argynnids*; but the discal cell of secondaries is open. The species referred to *Melitaea* have the apices of primaries somewhat more produced than those referred to *Phyciodes*.

Eresia and *Synchlœ* are very near to *Melitaea* and are by some considered identical with it. The former has somewhat more elongate wings and more abruptly clavate antennæ, the latter is slightly excavated at outer margin of primaries below apex. These genera are very unsatisfactorily distinguished.

In *Vanessa* and *Grapta* the discal cell of both wings is open; the primaries are angulated, the secondaries shortly tailed. The species re-

ferred to *Grapta* have a silvery mark on the underside of secondaries; those referred to *Vanessa* are without this distinction.

Pyrameis is closely allied; but the wings are not angulate nor tailed, and the secondaries are ocellate and marbled beneath. Above they are as in *Vanessa*, red or brownish inclining to tawny; with black apices, maculate with white spots.

Funonia is a dark form, with one large ocellus on primaries, and two on secondaries, which give the insect a distinctive appearance. The discal cell of both wings is open. *Anartia* is a peculiar livid form, somewhat resembling *Funonia*; but having the ocelli small, and the secondaries lobate or slightly tailed.

Callicore is represented in our fauna by a very handsome species—*Clymene*. It is black, with an iridescent blue band, and a subapical white spot. The genus has the discal cell of both wings open, trigonate primaries and obovate secondaries.

Limenitis has the cell of secondaries open; the species are large; the primaries trigonate, somewhat excavate below apex. They are variable in color; *dissippus* resembling *Danais* in maculation, while *arthemis* is black with a broad white median fascia on both wings.

Heterochroa is closely allied; but has the wings dentate or scalloped: our species is peculiar by a large subapical yellowish patch on the black primaries.

Apatura has broad primaries strongly produced at apex, slightly excavated below, and the anal angle of secondaries somewhat produced. The discal cell in both wings is open. The ornamentation consists of white spots in the black apical region of primaries, one or more black ocelli above vein two, near the margin; a row of submarginal ocelli on secondaries above; and a mottled and ocellate underside.

Eurema has the secondaries tailed, the primaries subangulate, discal cell of both wings closed, tibiae and tarsi densely spined.

Timetes has the discal cell of both wings open, secondaries with long tails, and lengthily produced anal angle. The primaries are subfalcate, and the ornamentation consists of transverse lines or shades crossing both wings.

Paphia is a robust form, with tailed secondaries and subfalcate primaries. The underside of secondaries has a "dead leaf" appearance which is peculiar and renders the insect easily recognizable.

Eunica and *Cystineura* show an approach to the *Satyrilae* in the dilated veins of primaries. The former is dark in color with subcaudate

secondaries and subfalcate primaries. The latter is a pale yellowish white, with dusky margins to primaries and an orange outward shading on secondaries. The wings are entire.

Agonisthos and *Victorina* are said to occur occasionally in the Southern U. S.; but are scarcely proper parts of our fauna. All the preceding genera are treated of and the species thereof described in the former volumes of the Bulletin.

Ageronia is a very interesting genus, intermédiaire to some extent between the *Nymphalinae* and *Satyrinae*. The costal vein of primaries is inflated, and the palpi are long. The head is broad, the eyes prominent, and the body robust. The pupæ are slender, girthed at middle, and have two ear-like tubercles. The imagines are said to produce a squeaky sound, alight on the trunks of trees and rest head downward, with expanded wings. These peculiarities have been considered sufficient to entitle the insects to sub-family rank. The middle femora are unusually long. Our species are more or less mottled with greenish and white.

The *Satyrinae* comprise butterflies of medium size, usually dull smoky brown colors, rather thin large wings and only moderately robust bodies. The ornamentation is usually more or less ocellate in character, and often very variable. This sub-family, or, as some prefer to consider it, family, has been placed at the head of the butterflies because the fore legs are most aborted, and because the *Chrysalis* illustrates the extreme remove from the girthed forms, being suspended by the tail only, and not at all angulate, the abdominal portion contracted in size and the thoracic region well developed.

The genera all have the veins more or less inflated at root, and modifications of this character afford convenient bases for genera.

Neonympha has two veins inflated at base, the wings entire and tibiæ not, or feebly, spinulated. The species are mostly without maculation above, or have only an apical ocellus on primaries; but differ in the maculation of under side.

Coenonympha has the three principal veins inflated at base. The species are small and unlike most others of the sub-family are usually pale, yellowish or whitish in color. The species are indefinite and largely opinionative.

Erebia has but two veins inflated, and has the club of antennæ distinct, flattened. The species have often a reddish suffusion, and are more or less ocellated above.

Debis and *Satyrodes* have the veins very slightly and gradually swollen or inflated. The latter has the secondaries entire, much as in *Neonympha*, while *Debis* has them dentate and subcaudate.

Gyrocheilus has two veins inflated: the antennal club is very gradual and not flattened, and the tibiæ are profusely spined. Our single species is black, the primaries with small white dots toward apices, the secondaries with outer margin more or less broadly orange. The hind wings too, are dentate.

Hipparchia has somewhat produced primaries, and very short middle tibia. A single species, *Ridingsii* occurs in our fauna; it is dull smoky gray, all wings with an irregular pale submarginal band, in which are ocelli.

Satyrus has the veins very suddenly inflated; the primaries rather large, secondaries with outer margin somewhat dentate or waved. The species are of moderate size, and the primaries are furnished with one, two, or three ocellate spots often set in a pale submarginal band. Beneath, the secondaries have usually a sub-marginal row of ocelli. The species of this genus are very variable and largely opinionative. They afford excellent examples of local races, breeding true to themselves; but in some places intergrading.

Chionobas is readily distinguished by the greatly produced apices of primaries, the thinly scaled wings, and the unusually ample secondaries. The species are northern, or mountainous.

The *Libytheinae* are very readily distinguished by their long palpi, which project forward far beyond the head, forming an obvious snout, resembling that of some of the *Deltoide* genera. A single species of *Libythea* represents the sub-family in our fauna.

The *Erycinidae* or gossamer winged butterflies are rather small, usually reddish or fulvous in color, showing their relationship to the following *Lycaenidae*. *Lemonias* is rather a robust form, with the costa of primaries straight or little arched. *Charis* is much slighter and the wings are more rounded. *Eumaeus* has the wings more or less suffused with metallic scales, and on the underside are silvery blotches.

Nemeobius resembles *Chrysophanus* in color and maculation; but the primaries are more acute at apex. None of the genera are well represented in our fauna, and the species are southern and southwestern.

The *Lycaenidae*—blues, coppers and hair streaks in common parlance—are readily recognized by the small size, the marked colors which led to their popular names, and the apparently complete foretarsi of both

sexes. Really the ♂ has the fore tarsus formed of but a single joint in the cases examined by me, though that joint is clothed and ringed so as to appear upon superficial examination to be normally divided. The common *Chrys. americana* well illustrates this.

Though the species are numerous the genera are few in number.

Thecla is distinguished by the usually prominent shoulder of forewings and somewhat elongate secondaries: the latter are usually furnished with filiform tails, or are notched or dentate.

Fenesica is without tails, fulvous in color with rather wide black margin to primaries.

Lycaena and *Chrysophanus* differ little in structure and are by many regarded as identical. In the latter genus the eyes are hairy, the spinulation of tarsi strong, the colors usually coppery in at least one sex, and maculation consisting of black spots.

Lycaena has naked eyes, more feebly spined tarsi and the color is blue, in at least one sex.

The *Papilionidae* are, comparatively speaking, poorly represented in our country. The brilliant *Morphos* and *Ornithopteras* are entirely wanting and but a very limited number of what may be considered the more typical group of *Papilio* are found north of Mexico.

Two sub-families are represented—*Pierinae* and *Papilioninae*.

The *Pierinae* are medium or small sized insects, white, yellow or orange in color; the secondaries grooved for the reception of the abdomen, six complete legs, the anterior tibia without epiphysis.

Pieris is white, or pale yellowish, often mottled with black; moderate in size, the antennæ abruptly terminating in an avoid club.

Nathalis is a small form, yellow in color; the primaries considerably enlarged outwardly, the secondaries proportionately rather small. The anterior margin of secondaries in ♂ with an oval glandular naked impression.

Anthocharis has rather short antennæ and proportionate wings. The underside of secondaries is mottled with greenish-gray and the primaries have often a large orange apical patch. The general color is whitish or greenish pale yellow.

Callidryas contains large insects usually yellow in color, the inner margin of primaries sinuate, the secondaries beneath with silvered spots. The antennal club is very gradual and the antennæ themselves, short.

Kricogonia lacks the silver spots beneath, and the antennal club is truncate.

Colias contains moderate sized species, yellow or orange in color, usually with a broad black margin to both wings and a discal spot on primaries. In some species the black is so arranged that the inclosed yellow space has a rude resemblance to a dogs head. Beneath, the secondaries are furnished with silvered discal spots. The antennæ are very short and stout; the club is truncate. The species are numerous, illy defined and largely opinionative.

Terias contains small species with markings often similar to those of *Colias*. The primaries are short, with a distinct shoulder near base, rectangular apices and straight outer margin.

The *Papilioninae* have but two genera in our fauna, distinct from all the preceding forms by having the anterior tibia furnished with epiphysis. In this respect these insects approach most nearly to the *Hesperidae* and through them to the *Heterocera* in which this structure is universal.

Parnassius has moderate sized species with very thinly scaled wings, entire secondaries which are not grooved to receive the abdomen, and the ♀ is furnished with a very peculiar pouch near tip. The larva pupates in a thin cocoon and thus furnishes another link connecting this family with the *Hesperidae*. The ornamentation consists of black spots, some of them ocellate with orange. The antennal club is not arquate.

Papilio contains large insects, usually black maculate with yellow and blue, or yellow maculate with black. The secondaries are usually tailed and somewhat elongate, not grooved to receive the abdomen; the wings are densely scaled and the antennal club arquate.

The distinctive characters of the *Hesperidae* have been already noted and only an enumeration of the genera is necessary. Mr. E. M. Aaron who has made a special study of this family, informs me that the genera at present catalogued are imperfectly and sometimes erroneously defined. As he has kindly promised to furnish the Mss. for the synopses of Lepidoptera when this family is reached, a superficial survey is all that I shall at present attempt.

Carterocephalus differs from all our other genera by lacking the tibial epiphysis and having but a single pair of spurs to hind tibia.

Ancyloxypha contains a small species with blunt primaries, spined median tibia and long abdomen. The terminal joint of palpi is long and slender.

Thymelicus has the same palpal structure but the antennæ are truncate at tip and the secondaries somewhat prolonged at anal angle.

Copaeodes is more like *Pamphila* in appearance, but smaller. The antennæ truncate, the middle tibia not spined.

Pamphila has the antennæ terminating in a little bent hook beyond the club, and the secondaries are somewhat produced at anal angle. The ♂♂ lack the costal fold.

Amblyscirtes is very like the preceding but the secondaries are evenly rounded and the primaries usually broader.

Pyrgus has the antennæ somewhat compressed at tip; a distinct brush at base, costal fold in ♂♂ distinct, discoidal stripe wanting. The species are checkered with white, and easily recognized.

Thanaos has the antennæ spindle shaped, the club arquate, and rather acutely terminated. The palpi are very densely clothed with bristly hair and the primaries are short.

Systasea is very like the preceding but the palpi are shorter, more sparsely clothed, and the antennal club is more slender.

Pholisora is also like *Thanaos*, but the brush at base of antennæ is scaly instead of hairy.

Achlyodes is peculiar by the irregular angulate wing form, which is unique in this family.

Eudamus contains large species with somewhat pointed primaries; lobate, often tailed secondaries and recurved antennal tips.

Erycides is very like the preceding but has the wing form of *Pamphila*.

Pyrrhopyga is very like *Eudamus* but the club of antennæ is obtuse, not slender, acute.

Aegiale is perhaps the most distinct genus in this portion of the series. The species are large, the body very robust, abdomen exceeding the secondaries which are not tailed. The antennæ are short, stout, straight and truncate at tip. The life history of *A. Yuccae* has been well described by Prof. C. V. Riley and the relationship of the *Hesperidae* with the *Cusiniæ* discussed.

In the next paper some Heterocerous families will be discussed.

(To be continued.)

Taeniopteryx fasciata.

This species claims the right to be one of our earlier insects. I found the pupæ, to-day; Jan. 21st, crawling on the ice, over a small brook near Philadelphia. It is explained by the sun being warm and the day not very cold. According to Dr Hagen, Synop. N. A. Neurop. 1861, p. 34, Osten Sacken took it in Washington in April.

Are Curculio Larvae Lignivorous?

BY WARREN KNAUS.

This question is discussed in Prof. J. A. Lintner's First Annual Report on the injurious and other Insects of the State of New York, on pages 258 and 259. Thomas Walsh thought the larvæ of *Sphenophorus sculptilis* Uhler, lived in decaying and moist wood. Mr. Lintner holds a different view, believing that the larva of this species does not differ from the habits of the family, these insects being entirely herbivorous,—quoting Westwood and C. V. Riley as authorities. Mr. Riley however is also quoted as agreeing with Walsh as to the habits of the species under discussion there.

While I do not wish to be understood as disputing such eminent testimony bearing on the food habits of these Coleoptera, my own observations have led me to adopt a conclusion somewhat different concerning at least one genus placed very near to the *Scolytidae*. I refer to *Wollastonia quercicola* (Boheman).

For the past three seasons I have taken this insect from Cottonwood logs in a somewhat advanced state of decay. Cottonwood is the most abundant timber in the valley of the Smoky Hill River in this, Salina, County, and I have examined trunks of the trees used in buildings, which were completely honeycombed by a small wood boring larva. I first took this beetle in the season of 1881, it appearing about the first week in June and continuing until July.

I have invariably taken this insect on or in, or in the immediate vicinity of Cottonwood logs or stumps. The present season I took about a dozen specimens from logs that had been used in a stable for the past seventeen years; a number were taken from the larval burrows, and numbers of small white fleshy larvæ were also observed in the same pieces of timber: these larvæ I feel confident were those of *W. quercicola*, but as I found no pupæ and did not continue my observation on their transformations, I cannot speak with absolute certainty.

I am still further strengthened in the conviction that the larvæ of this insect are wood eating, by the fact that it has a close structural relation to the *Scolytidae*. This is pointed out in Leconte and Horn's Classification of North American Coleoptera, and the affinities of several genera (closely related to the one under discussion), with particular genera of *Scolytidae* are specially noticed. Further observation, I trust, will remove all doubts as to the food habits of *Wollastonia quercicola*.

Dynastes, again.

In Mr. Doll's article on page 120, I was responsible for the "Colorado". This was error: "Hell's Canon" is in Arizona, some forty miles from Prescott. Dr. Horn informs me that the species was probably his *Grantii*, though none of his specimens are as large as those caught by Mr. Doll. *Grantii* occurs in Arizona, Colorado and New Mexico; and with Mr. Doll's note on its habits they should be found by any collector visiting those States, even though they be not fortunate enough to enjoy the trip through the canon with the suggestive name. The date, it may be added, was September. J. B. S.

Book Notice.

Short Studies of North American Coleoptera. (No. 2.) By John L. Leconte, M. D. Trans. Am. Ent. Soc. XII, pp. 1 to 32.

This is a collection of such fragmentary manuscripts as were left by Dr. Leconte at the time of his death, edited by Dr. Horn. It contains descriptions of a considerable number of new species and a revision of four genera of the *Elateridae*—*Drasterius*, *Megapenthes*, *Elater* and *Agriotes*. A considerable amount of new synonymy is contained in this paper, and the tables are clear and very practical.

* * *

A Study of some Genera of Elateridae. By Geo. H. Horn, M. D. Trans. Am. Ent. Soc. XII, pp. 33 to 52.

This paper is to an extent supplementary to that preceding, containing synopses of *Horistonotus*, *Esthesopus* and *Ludius*, and brief notes on several other genera. Dr. Horn's work is always well done, and this paper is no exception.

These two papers partially fill a great gap in our literature, for the Elaterid genera are not only very indefinite, but there is also so much variation in and yet so much resemblance between species, that proper determination has been a matter of great difficulty, and considerable uncertainty. *Melanotus*, *Limonius* and *Corymbites* are still stumbling blocks and we hope that Dr. Horn's plans provide for an early review of those genera.

* * *

We have received from Prof. Fernald and Mr. Hy. Edwards that part of the "Standard Natural History" devoted to Lepidoptera. According to the plan of the work, Prof. Fernald begins with the lowest of the *Heterocera* and Mr. Edwards ends with *Papilio*, as the highest of the *Rhopalocera*. In judging of this work it must be remembered—I quote Prof. Fernald—"that I was allowed only so many pages, and 'it must be popular'". Of course, under those circumstances only the most cursory survey of the field could be taken. And Entomology seems after all to occupy only a secondary or tertiary position in the estimation of the publishers; so that besides an enumeration and popular definition of the prin-

cial groups, and remarks on a few species of economic interest or extraordinary splendor, nothing is attempted. Not only American but exotic forms are embraced, and a fair number of illustrations—some of them distressingly familiar—are given. To the Entomologist there is nothing of special interest: to the general reader there is enough to hold his attention. If the remainder of the work be as superficial as what we have seen of the Entomological portion, the title "Standard" is a misnomer. Of course no criticism is intended adverse to Messrs. Fernald and Edwards. Their work is the best that could be produced under the circumstances, and Prof. Fernald's review of the Heterocera in 30 pages is certainly as well done as it could possibly be in that space. Referring again to the illustrations, it is certainly inexcusable that fig. 557 is given as that of a *Tineid*, while in fact it is placed in our lists among the *Zygaenidae* and is probably a *Lithosiid*. Fig. 561, as the "codling moth" is certainly the poorest portrait of that insect that was ever perpetrated. Prof. Fernald disclaims all responsibility for figures, and we do not believe that he would be guilty of such blunders.

J. B. S.

Notice to Readers.

With this number, the Bulletin of the Brooklyn Entomological Society ceases to exist. For seven years we have done our mite toward advancing the science of Entomology, and have gradually grown and received support from every hand. It is with a feeling of pride that we look back and note improvement in our paper.

The unanimous expression of the desirability of a union of Entomological Journals into one paper which might call to it the support of all those interested in Entomology, led to negotiations between the representatives of the "Bulletin" and "Papilio"; resulting in an arrangement for the issuing of a new publication, for which the name "Entomologica Americana" was decided on.

It was decided that the new Journal should be issued by the Brooklyn Entomological Society, and the measures taken by that Society for the support of the new Journal are found in the following by-laws of the Society.

The first number of the new Journal which we commend to all Entomologists will be issued in April and will be sent to the subscribers of two Journal above named. It will be edited by Mr. John B. Smith, and the subscription price will be \$2.00 per annum.

THE PUBLICATION COMMITTEE.

CERTIFICATE OF INCORPORATION.

STATE OF NEW YORK, }
COUNTY OF KINGS. } ss.

We, Edward L. Græf, George D. Hulst, John B. Smith, Berthold Neumøgen, Charles W. Leng and Christopher H. Roberts, all of full age, citizens of the United States and of the State of New York, do hereby certify that we desire to form a Society pursuant to the provisions of an act entitled "An Act for the Incorporation of benevolent, charitable, scientific and missionary Societies", passed April 12, 1848, and the several acts extending and amending said act.

That the corporate name of said Society shall be the "Brooklyn Entomological Society".

That the object, for which the Society is to be formed, is the advancement of the science of Entomology in all its branches.

That the term of the existence of said Society is to be fifty years.

That the number of trustees that shall manage the affairs of the Society is seven and they shall be termed the Executive Committee.

That the names of the trustees or members of the Executive Committee who shall manage the affairs of the Society for the first year of its corporate existence are: Edward L. Græf, Fredk. Tepper, George D. Hulst, Henry Edwards, Berthold Neumøgen, John B. Smith and Christopher H. Roberts.

That the name of the City and County in which the operations of said Society are to be carried on, are the City of Brooklyn and County of Kings.

In Witness whereof we have hereunto set our hands this 13th day of January 1885.

EDW. L. GRAEF, GEO. D. HULST, JOHN B. SMITH,
BERTHOLD NEUMOEGEN, CHAS. W. LENG, CHRISTOPHER H. ROBERTS.

STATE OF NEW YORK, }
CITY OF BROOKLYN, } ss.
COUNTY OF KINGS. }

On this 13th day of January 1885, before me personally came and appeared Edward L. Græf, George D. Hulst and John B. Smith to me known to be three of the individuals described in and who executed the foregoing certificate, and they severally before me signed the said certificate and acknowledged that they executed the same for the purposes therein mentioned.

ARCHIBALD C. WEEKS,
Notary Public, Kings County.

STATE OF NEW YORK, }
CITY AND COUNTY OF NEW YORK. } ss.

On the 16th day of January, 1885, before me personally came Berthold Neumoe-gen, and on the 23d day of January, 1885, before me personally came Charles W. Leng, and on the 26th day of January, 1885, before me personally came Christopher H. Roberts to me personally known and known to me to be three of the individuals described in and who executed the foregoing certificate and severally acknowledged to me that they executed the same for the uses and purposes therein expressed.

ARCHIBALD C. WEEKS,

Notary Public, Kings County.

Certificate filed in New York County.

(ENDORSEMENT,)

I, a Justice of the Supreme Court of the District in which the principal office of the Brooklyn Entomological Society is to be located do hereby approve in all respects of the within certificate of incorporation of said Society, and consent that the same be filed pursuant to law.

Dated Brooklyn, January 27, 1885.

EDGAR M. CULLEN,

J. S. C.

STATE OF NEW YORK. }
COUNTY OF KINGS. } ss.

I, Rodney Thursby, Clerk of the County of Kings, and Clerk of the Supreme Court of the State of New York, in and for said County (said Court being a Court of Record) do hereby certify, that I have compared the annexed with the original certificate of Incorporation of "Brooklyn Entomological Society" filed and recorded in my office January 27, 1885, and that the same is a true transcript thereof and of the whole of such original. In testimony whereof I have hereunto set my hand and affixed the seal of said County and Court, this 27th day of January, 1885.

RODNEY THURSBY,

(L. S.)

Clerk.

STATE OF NEW YORK. }
OFFICE OF THE SECRETARY OF STATE. } ss.

I have compared the preceding with the original Certificate of Incorporation of Brooklyn Entomological Society with acknowledgment thereto annexed filed and recorded in this office on the 27th day of January, 1885, and do hereby certify the same to be a correct transcript therefrom and of the whole of the said original.

(L. S.)

Witness my hand and the seal of office of the Secretary of State, at the City of Albany this 27th day of January, one thousand eight hundred and eighty-five.

JOSEPH B. CARR,

Secretary of State.

The following is a list of those who have subscribed as original members or indicated their intention so to do.*

G. W. J. Angell.	Alwin Gottweiss.	Christ. H. Roberts.
Wm. Beuttenmuller.	Edw. L. Graef.	Stephen P. Sammis.
A. W. Putman Cramer.	H. Herper.	L. C. Schenk.
Jacob Doll.	Geo. D. Hulst.	W. Schenk.
Chas. A. A. Duering.	Chas. W. Leng.	F. M. Schwensen.
Henry Edwards.	M. L. Linell.	John B. Smith.
S. L. Elliot.	A. Luetgens.	F. A. Stinner.
Geo. Frank.	Jul. Eduard Meyer.	Fredk. Tepper.
Chas. Fuchs.	Julius Mohns.	Wm. Waters.
Geo. Gade.	B. Neumoegen.	Archibald C. Weeks.
Chas. F. Gaul.	Richd. F. Pearsall.	

BY-LAWS OF THE BROOKLYN ENTOMOLOGICAL SOCIETY.

ARTICLE I.

OF MEMBERS.

Sec. 1. The society shall consist of ordinary, life, corresponding and honorary members. The ordinary and life members only shall be members of the corporation, and shall be entitled to vote, hold office and transact business.

Sec. 2. Corresponding and honorary members shall be entitled to all other privileges of ordinary and life members, but shall not be subject to fees or dues.

Sec. 3. All members shall be entitled to all the publications of the Society and to all other advantages save as above specified.

Sec. 4. Honorary members may be elected on motion of any life or ordinary member at any stated meeting of the Society; but no person shall be elected as such, unless he has attained a recognized high rank in Entomological Science, or has done some act materially furthering the progress of Entomology or of the Brooklyn Entomological Society.

Sec. 5. Corresponding members may be elected at any stated meeting of the society, on like motion as in the case of honorary members; and any person not a resident of the United States from whom the society receives benefits in the way of additions to its library, or in any other material way, is eligible as such member.

* A few others are still to be heard from.

Sec. 6. Ordinary and life members may be proposed by an ordinary or life member of the society at any stated meeting, but shall not be elected until the next stated meeting, except upon motion of some person other than the proposer, and upon unanimous consent of those present. A three-fourths vote of those members present is required to elect a member of any class.

Sec. 7. Any person regularly elected may become a life member by the payment of fifty dollars in money, or in what the society shall consider an equivalent thereto, and he shall not be subject to any further dues or assessments; nor shall he be required to pay an initiation fee, if originally proposed as a life member.

Sec. 8. Ordinary members shall on election pay an initiation fee of two dollars, and annual dues to an amount not exceeding six dollars, payable in equal monthly instalments; but no dues shall be charged for the month, in which he is elected. The dues shall be six dollars per annum until reduced by a resolution of the society, passed as prescribed by law for a change of by-laws.

Sec. 9. Members six months in arrear shall be notified by the Treasurer; and if such indebtedness continue for three months thereafter, such member shall upon one month's previous notice in writing be dropped from the roll of the Society, unless the executive committee, for reasons deemed sufficient by them, accord a further extension of time.

ARTICLE II.

OF OFFICERS AND THEIR DUTIES.

Sec. 1. The affairs of the society shall be managed by an Executive Committee of seven, of which the President and Treasurer of the society shall be *ex-officio* members. The executive committee shall be elected each year at the annual meeting, and shall hold office for one year, or until their successors are elected. Vacancies by death, resignation or otherwise may be filled at any stated meeting, and the person elected to fill a vacancy shall hold office only during the unexpired term of the person in whose place he was elected. The executive committee shall have charge of all the property of the society, and shall audit all bills, and transact all business relating to the society and not otherwise provided for. The vote of a majority of all the members of the committee shall be necessary to authorize any expenditures of money, or other disposition of property belonging to the society.

Sec. 2. The other officers shall be a President, Vice President, a Corresponding Secretary, a Recording Secretary, a Treasurer, a Curator, a Librarian and a Publication Committee; all of whom shall be elected by ballot at the annual meeting, and serve one year, or until their successors are elected. Vacancies by death, resignation or otherwise may be filled at any stated meeting for the unexpired term only. In case for any reason officers can not be elected at the annual meeting, they may be elected at the next, or any future stated meeting, and the officers of the preceding year shall hold over until their successors are elected. A majority vote of those present and voting shall be requisite for election.

Sec. 3. The President, or in his absence the Vice President, shall preside at the meetings of the society and perform all other duties usually appertaining to that office. The President shall also be *ex-officio* chairman of the executive committee.

Sec. 4. The corresponding Secretary shall conduct and preserve the correspondence of the society.

Sec. 5. The recording Secretary shall keep a book containing an accurate record of the transactions of the Society. Such book shall always be open to the inspection of members of the society.

Sec. 6. The Treasurer shall have charge of and shall be authorized to receive all moneys belonging or due to the society, and pay all proper claims against it, after they have been audited by the executive committee. He shall have power to deposit moneys in any Banking Institution selected by the executive committee, in the name of the society, and shall have power to draw checks, sign receipts and do all necessary acts relating to the proper management and care of the moneys of the society. He shall keep an accurate record of his transactions in a book, which shall always be open to the inspection of members and shall report monthly upon the state of the assets and liabilities.

Sec. 7. The Librarian and Curator shall respectively have charge of the library and collection of the society.

ARTICLE III.

OF MEETINGS.

Sec. 1. The stated meetings shall be held on the first Tuesday of each month, and its annual meeting on the first Tuesday after the first Monday in January.

Sec. 2. Special meetings may, and on the written request of five members shall be called by the President at any time, at least three days notice thereof being sent to each member.

Sec. 3. Seven members shall constitute a quorum for the transaction of business.

Sec. 4. The order of business at stated meetings shall be as follows:

1. Reading and action on the minutes of the previous meeting.
2. Reports of Officers and Committees.
3. Proposals and Elections.
4. Donations to Cabinet and Library.
5. Written communications.
6. Verbal communications.
7. Unfinished business.
8. Informal discussion—on motion.
9. New business.
10. Scientific discussion.
11. Adjournment.

ARTICLE IV.

PUBLICATIONS.

Sec. 1. The publications of the society shall be managed by a committee to consist of four members and the editor or editors for the time being. They shall be elected at the annual meeting in the same way as are the other officers and shall hold office for one year, or until their successors are elected.

Sec. 2. An editor or editors shall be elected annually by the society at the stated meeting held previous to the termination of the current volume, who shall, subject to the control of the publication committee have charge of the society's publications, and shall hold office until his or their successor or successors is or are elected. He or they shall be members of the publication committee, and one of them shall be selected by the committee as chairman. He, or if more than one, either of them, may at any time call a meeting of the committee.

Sec. 3. The society shall support and publish a monthly Journal to be called *Entomologica Americana*, which shall contain the proceedings of the society, and such matter on general and special Entomology as the publication committee shall order printed.

Sec. 4. To support such Journal a publication fund shall be established by the society, which shall consist of: 1st, Voluntary contributions; 2nd, The money proceeds of Life Memberships; 3d, Surplus revenue, after paying current expenses; among which is to be considered the cost of publishing the current volume in each year.

Sec. 5. The principal of this fund shall remain intact, and shall be invested by the Treasurer, under the direction of the executive committee. The interest of the fund shall annually be added to the principal until the limit hereinafter specified is reached, unless the same is declared by the publication committee to be necessary to pay any part of the deficit arising from the publication of the Journal.

Sec. 6. The amount of the publication fund shall be limited to ten thousand dollars. Whenever that limit is reached the sums otherwise to be applied to it shall be applied to the library and collections of the society, or in such other manner as the society shall determine.

Sec. 7. Whenever the income of the publication fund shall exceed in amount the difference between the amount of subscriptions received and the cost of publishing the journal of the society, then the latter shall be enlarged to such an extent as the surplus shall warrant, or the surplus shall be used in such other publications as the society shall decide to issue.

Sec. 8. The Journal, *Entomologica Americana*, shall be issued monthly and twelve numbers shall constitute a volume. The numbers during the first year shall average twenty pages, and in future years such number as the sums applicable to the payment of current volumes shall authorize.

Sec. 9. Current volumes of the journal shall be paid for:—first, By subscriptions; second, The ordinary revenue of the society, after deducting the necessary expenses authorized by the executive committee; third, By donations for that purpose.

ARTICLE V.

BY-LAWS.

These by-laws are adopted pursuant to the provisions of the statutes under which this society is incorporated, and alterations or amendments shall not be made except in accordance with said statutes. Any alteration or amendment must be proposed in writing at a stated meeting, and shall not be acted upon until the next stated meeting. A three-fourth vote of all the members present and voting shall be necessary to carry any amendment.

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ERRATA.

Page 30 under category 23, for "present" read "wanting" on first line. On second line, for "wanting" read "present".

" 65 insert after the description of *L. tabacinus*, the locality Arizona.

" 66 9th line from bottom for Laferte, read La Ferté.

" 66 7th " " " localition, read localities.

" 67 10th " " " top " fully, read feebly.

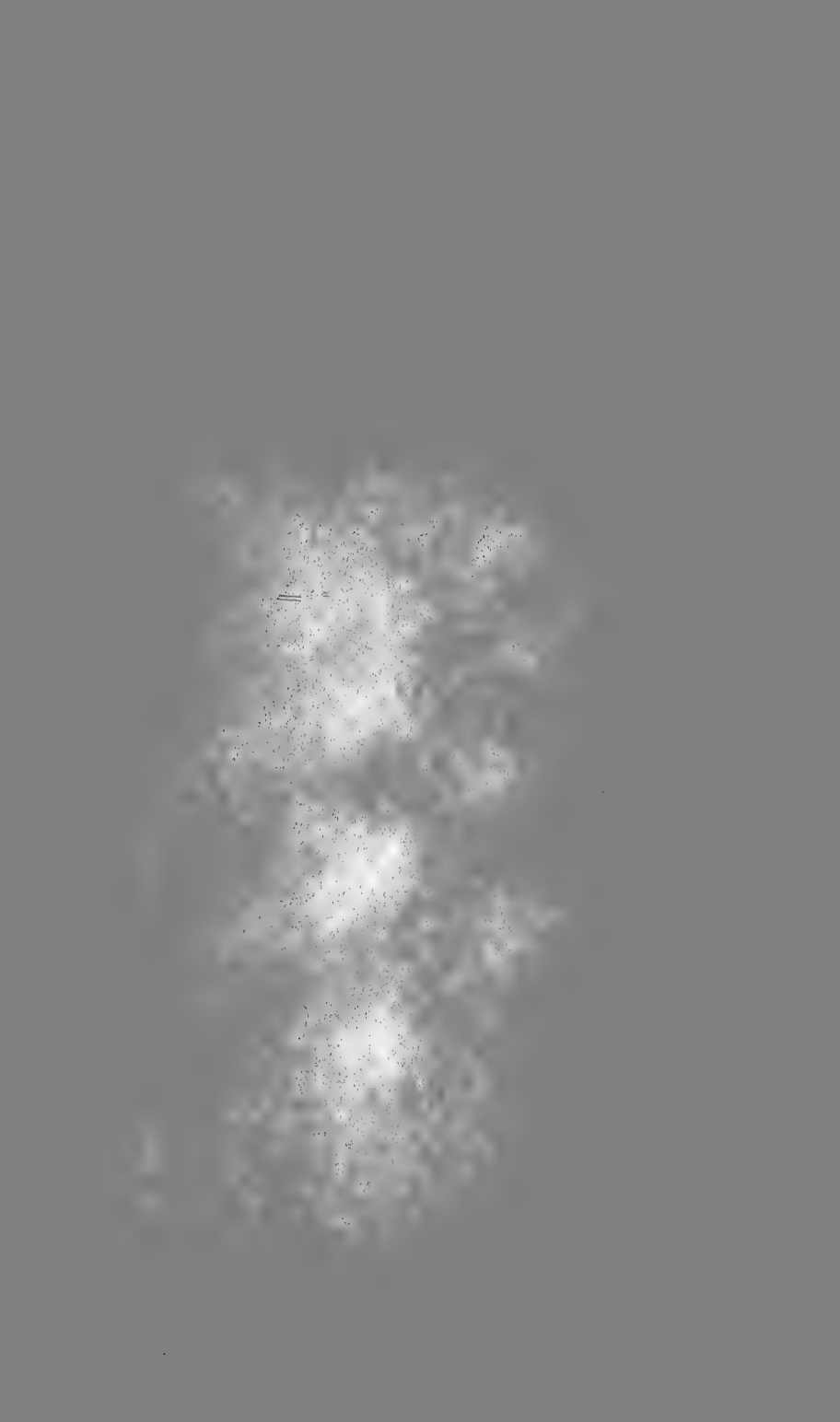
" 83 29th " " " first word for 25 read 22.

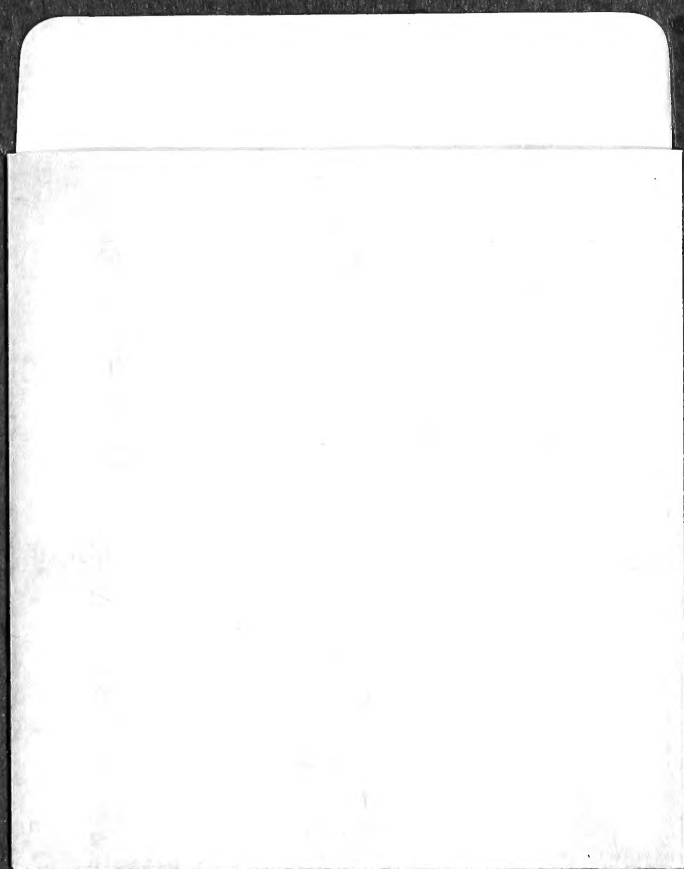
" 85 10th " " " for "wigs" read "twigs".

" 111 for "Isosoma grandis" read "Isosoma grande".

" 121 line 22, for "is there" read "there is".

* Where no authority is specified, Mr. Chas. W. Leng is understood. The synopses of families and genera are adopted from the "Classification".





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